



Millennium Group Access Control

NetDCD/ ESCU / EDCD INSTALLATION GUIDE

REVISION A9

Millennium Group
16 Tech Circle
Natick, MA 01760
<http://www.millennium-groupinc.com>
Fax: 508-651-2902 Phone: 866-455-5222



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ESCU, Net DCD-n, EDCD Units

Table 1-1 summarizes the ESCU, Net DCD-n, and EDCD offerings.

- The ESCU and Net DCD-n boards have an on-board Ethernet NIC.
- The EDCD connects to either a ESCU or Net DCD-n using EIA-485 (RS-485).
- The Net DCD 2 supports two entry points (i.e., Door or Elevator).

Table 1-1: Enhanced SCU, Net DCD-n and DCD units

Unit	Part Number	Network	# Doors	Description
ESCU	149-101992	Yes	0	Enhanced Site Control Unit with Network
Single EDCD	149-101966	No	1	Single Enhanced Door Control Device
Net DCD-1	149-102002	Yes	1	Single Enhanced Door Control Device with Network
Net DCD-2	149-102003	Yes	2	Double Enhanced Door Control Device with Network

ESCU Layout

The ESCU provides the following new features:

- Onboard Ethernet interface
- 10 times faster download speeds when used with Enhanced Door Control Devices (EDCD)
- Flushable firmware - the firmware is upgradeable from the Millennium software, removing the need to physically replace e-proms on the board
- Protocol encoding - an operator can enable the communication protocol encoding between the board and the server
- Surface mount technology

The ESCU (Enhanced Site Control Unit) is a communications hub and memory buffer for the door controllers and other devices within the Millennium family.

A single ESCU can support up to:

- 100 EDCDs or DCDs
- 4 ECUs

Features

- All communication with the Server uses TCP/IP over Ethernet 10/100 bps. (CAT 5 minimum)
- Up to 1000 fully supervised ESCUs can be connected to a single PC running the Millennium Expert, Enterprise, Xtra, and Ultra software.

Power Requirements:

- 10-14VDC, Unit shall be powered by either PS1 power supply or UL Listed 294 power supply with power limited output. Current draw is 375 mA nominal.

Circuit Protection:

- Input power is protected from reverse polarity, over-voltage and transient surges

ESCU Device Communications:

- A twisted pair, multi-drop, EIA-485 (RS-485) polling scheme is used to communicate with other Millennium devices

Cover Tamper Switch:

- On-board integrated tamper switch

Operating Temperature:

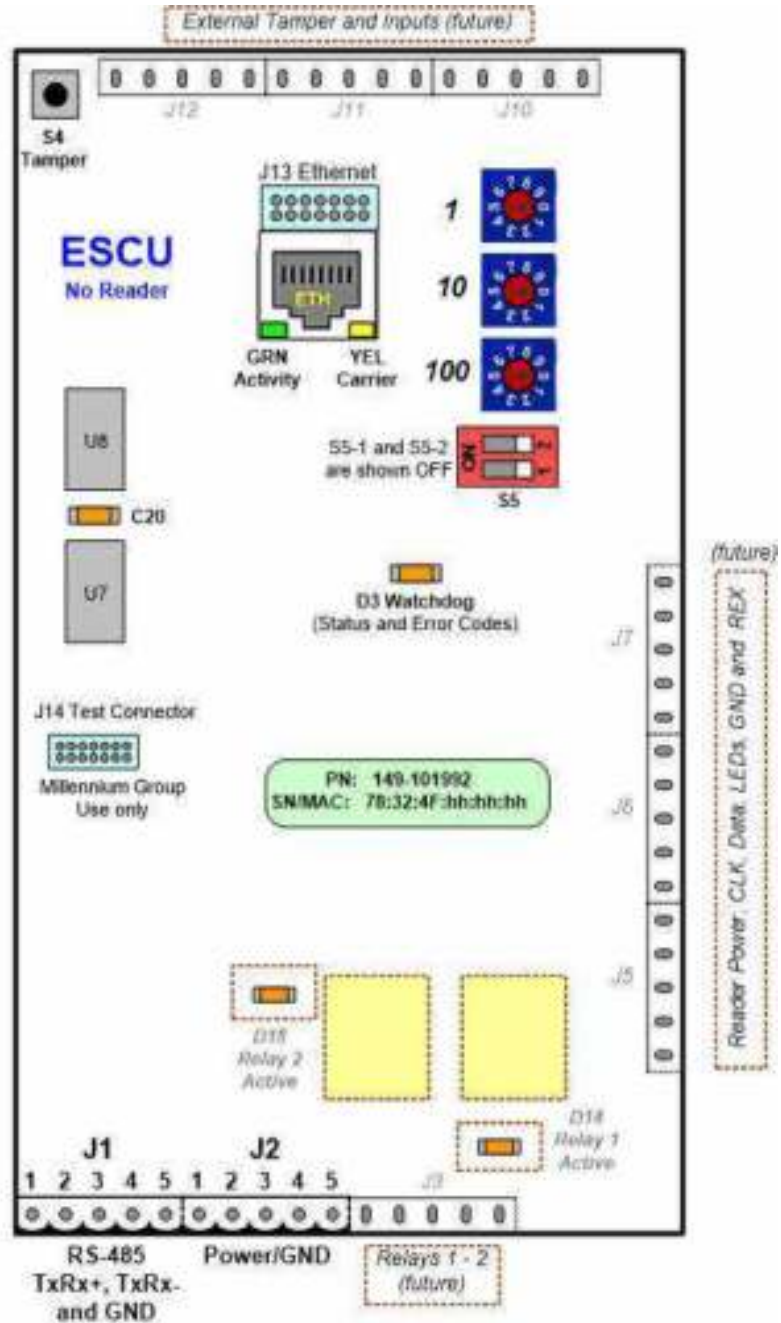
- 14° to 104°F (-10° to 40°C) with less than 90% non-condensing humidity

Dimensions:


- 4.24" x 7.35" @ < 1lb or (10.8 x 18.7cm @ < 0.45Kg)

ESCU Connectors, Switches, Inputs, Relays, and LEDs


Figure 1-1: ESCU with 0 Readers Drawing



ESCU Address Switches

- Three BCD rotary switches  that provide decimal addresses 000 through 999. Usually the first ESCU is unit 000.
- All ESCUs must have a unique address.

D3 Watch Dog

- A Red LED  Watch Dog that indicates ESCU Status and possible Error Codes. See “Watchdog LED (ESCU, Net DCD-n and EDCD)” on [page 4-2](#)

ID Sticker

- A factory installed sticker that indicates the ESCU part number and the Ethernet MAC address. The Millennium Group Vendor Code is Hex 78:32:4F and the last six nibbles are the unique address for this particular ESCU.

J1

- EIA-485 (RS-485) TxRx+, TxRx-, and GND. See “Power Cable” on [page 3-2](#)

J2

+ 12VDC and GND. See “Initial Setup of ESCU / Net DCD-n” on [page 2-2](#)

J5, 6, 7

- Not currently used.

J10, 11, 12

- Not currently used.

J13 Ethernet Connection

- Connector for the Network Adapter (NIC) board which provides the 10/100 Ethernet connection.



Remove power from the ESCU before inserting or removing the network adapter on J13. Use caution when inserting or removing the J13 connector as there are power pins that could damage the board if inserted incorrectly.

Ethernet LEDs

- RJ-45 8 pin connector has two built in LEDs that indicate Carrier Detect (Yellow) and Data Activity (Green). The Yellow Carrier Detect LED is important to observe when first setting the IP address of the ESCU. See “EIA-485 (RS-485) (ESCU / Net DCD-n and EDCD)” on [page 2-12](#)

J14 Test connector

- A special test connector used by Millennium Group Engineering and Support only.

S4 Tamper

- Built in Tamper switch.

S5 Factory Reset Method

- The S5-1 or S5-2 switch, along with the Tamper switch can be used to reset the ESCU back to the factory shipped state (e.g, IP = 192.168.0.254). The process where you reset the ESCU using the S5 switch is the 'True' factory reset. S5 will put the board back to the factory shipped state. See "S5 Factory Reset Method" on [page 4-10](#).

C20 Board Reset - Alternate Method

- The S5 and C20 resets are actually a bit different. Shorting C20 deletes memory from the board (i.e., current configuration and history of transactions) and resets the ESCU's *Owner Name* back to the default of *Demo. Not for sale*. Resetting using C20 retains the IP address, Baud rate, Ping setting and Gateway Router. The *Owner Name* is downloaded to the ESCU and the ESCU will only communicate to the software if the Site Name in the software = *Owner Name*. C20 is useful if the ESCU was previously communicating with a different system and the *Owner Name* needs to be reset so it will come on-line with the new system. See "Alternate Reset Method" on [page 4-11](#).

EDCD Layout

EDCD Connectors, Pin Outs, Switches, Relays, LEDs, etc.

The new, Enhanced Door Control Device (EDCD) is a redesign of the original DCD using updated technology and surface mount components. The EDCD offers:

- Greatly improved communication speeds. About 10 times faster than the original DCD, if used with the Enhanced Site Control Unit (ESCU) or NetDCD1.
- Flashable firmware. The firmware is upgradeable from the Millennium software, removing the need to physically replace e-proms on the board.
- 12VDC and 5VDC reader power. For UL 294, the reader port output recorded range for compatibility is 5VDC - 13VDC.
- Future enhancements. The EDCD was designed with future enhancements and expandability in mind.

ANSI / UL 294 (6th Ed.) Access Control Performance Levels

- Access Control Line Security Level = Level 1
- Destructive Attack Level = Level 1
- Endurance Test = Level IV
- Standby Power - Level II (For standby Power PS1 power supply is required)

NOTE

There are significant changes to the board layout and connections compared to the DCD. Please refer to the diagram below (Figure 1-2 on [page 1-9](#)) before connecting devices to the board. If replacing an original DCD with an EDCD, there are a few changes that will need to be made, specifically on the reader port, before connecting to the new EDCD. Also, see wiring diagrams in Chapter 3 - "How to Wire Readers, Inputs, Outputs" on [page 3-5](#)

The EDCD (Door Control Device) is designed to control a single access point (i.e., Door or Elevator). This device can accept inputs from most reader technologies, analog input devices, and analog inputs from Request to Exit and Door State devices.

In the event of a computer or communications failure it will still operate and log history transactions into the memory buffer.

Features

Evaluated Readers:

- Wiegand Card Reader protocols, configurable up to 200 bits, with Data 1 and Data 0 signaling.
 - HID Thin line II Access Control reader utilizing Wiegand signaling.
- Mag stripe technologies ABA/ISO Track 2 with configurable data bits or characters, using Clock and Data signaling.
 - ABA 2 Mag Readers - Model XICO 3892SD Magnetic Stripe Reader
- MARLOK optical key protocol. (*MARLOK protocol is not evaluated by UL.*)

Power Requirements

- 9-14VDC, from the Millennium PS1 Power Supply. Current consumption is 375mA nominal with no Reader. Reader current draws are generally 50-200 mA. If a Reader draws greater than 200 mA, it must be powered with a separate power supply. Be sure that both power supplies share a common GND connection.

Circuit Protection

- Input power is protected from reverse polarity, over voltage, and transient surges.

DCD Device Communications

- A twisted pair, multi-drop, EIA-485 (RS-485) polling scheme is used to communicate from the EDCD to the other Millennium Devices. See "Power Cable" on [page 3-2](#)

Dimensions

- 4.24" x 7.35" @ < 1lb or (10.4 x 18.7cm @ < 0.4Kg)

Programmable Relays

- Each EDCD employs 2 programmable Single pole, Form C, Dry relays that are rated for 4.0 amps @ 24VDC. The relays are suitable for inductive loads with a Power factor of 0.6.

Input Monitoring

- The EDCD has the capability to monitor up to seven independent inputs. Inputs 1-7 can be configured in the software to be either 2 state (no supervision resistors) or 4 state (supervised with 1K ohm resistors). The circuit must see a break time of at least 500 ms for the input to trigger. See "Inputs" on [page 3-8](#)

All Events History Buffer

- 2000 all events history, stored in RAM memory with a minimum of 24 hours backup.

Operating Temperature

- 14° to 104°F (-10° to 40°C) with less than 90% non-condensing humidity.

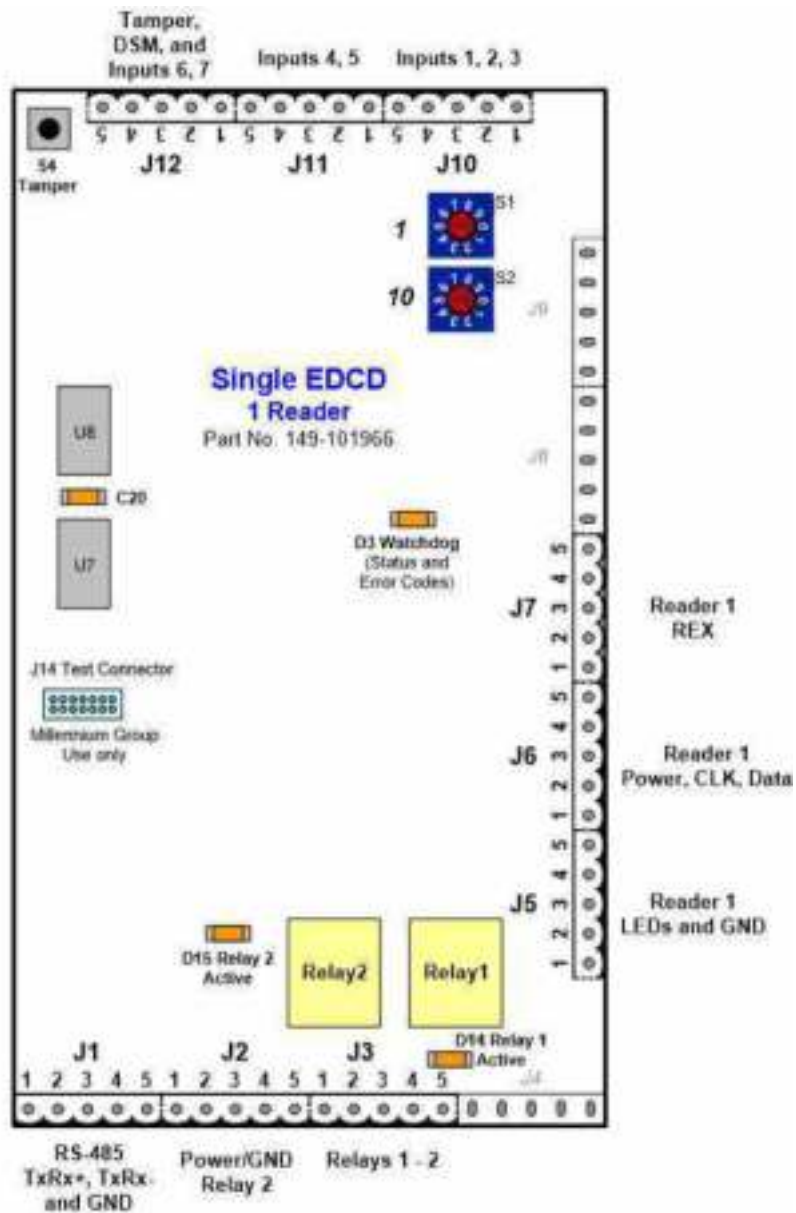
Event Buffer

- 100 software selectable priority events (inputs, com fail, etc.). These events are stored on-board if the ESCU is off-line with the host computer. They can be programmed to send signals back to the computer if they are enabled and activated.


Cover Tamper

- On-board integrated tamper switch.


Figure 1-2: EDCD with One Reader Drawing



EDCD Address Switches

- Two BCD rotary switches  that provide decimal addresses 00 through 99. Usually the first ESCU is unit 00.
- All EDCDs and DCDs, that are on the same Site, must have a unique address.

D3 Watch Dog

- A Red LED  Watch Dog that indicates EDCD Status and possible Error Codes. See “Watchdog LED (ESCU, Net DCD-n and EDCD)” on [page 4-2](#).

D14 and D15

- Red LEDs indicating when Relay1 (D14) and Relay 2 (D15) are active.

J1

- EIA-485 (RS-485) TxRx+, TxRx-, and GND. See “Power Cable” on [page3-2](#)

J2

- + 12VDC and GND. See “EIA-485 (RS-485) (ESCU / Net DCD-n and EDCD)” on [page 2-12](#)

J3

- Relays 1 and 2 Connections. See “Relays (Outputs)” on [page3-9](#)

J5, 6, 7

- Reader 1 Connections. See “Readers - Wiegand signaling” on [page3-5](#)

J10, 11, 12

- Inputs 1 through 7. See “Inputs” on [page3-8](#)

J14 Test connector

- A special connector used by Millennium Group Engineering and Support only.

S4 Tamper

- Built in Tamper switch. See “Inputs” on [page3-8](#)

Net DCD-1 and Net DCD-2 Layout

Net DCD-n Connectors, Pin Outs, Switches, Relays, LEDs, etc.

The new, Enhanced Door Control Devices (Net DCD-1 and Net DCD-2) offer one door and two door variations of the EDCCD with a built in Networking Interface (NIC).

The Ethernet Port is for supplemental use for UL compliance.

ANSI / UL 294 (6th Ed.) Access Control Performance Levels

- Access Control Line Security Level = Level 1
- Destructive Attack Level = Level 1
- Endurance Test = Level IV
- Standby Power - Level II (For standby Power PS1 power supply is required)

NOTE

There are significant changes to the board layout and connections compared to the DCD. Please refer to the diagrams below (Figure 1-3 on [page 1-13](#) and Figure 1-4 on [page 1-14](#)) before connecting devices to the board. If replacing an original DCD with an Net DCD-n, there are a few changes that will need to be made, specifically on the reader port, before connecting to the new Net DCD-n. Also, see wiring diagrams in Chapter 3 - "How to Wire Readers, Inputs, Outputs" on [page 3-5](#)

The Net DCD-1 and -2 (Door Control Device) are designed to control one or two access points (i.e., Doors or Elevators). This device can accept inputs from most reader technologies, analog input devices, and analog inputs from Request to Exit and Door State devices.

In the event of a computer or communications failure it will still operate and log history transactions into the memory buffer.

Features

Evaluated Readers:

- Wiegand Card Reader protocols, configurable up to 200 bits, with Data 1 and Data 0 signaling.
 - HID Thin line II Access Control reader utilizing Wiegand signaling.
- Mag stripe technologies ABA/ISO Track 2 with configurable data bits or characters, using Clock and Data signaling.
 - ABA 2 Mag Readers - Model XICO 3892SD Magnetic Stripe Reader
- MARLOK optical key protocol. (*MARLOK protocol is not evaluated by UL.*)

Power Requirements

- 9-14VDC, from the Millennium PS1 Power Supply. Current consumption is 375mA nominal with no Reader. Reader current draws are generally 50-200 mA. If a Reader draws greater than 200 mA, it must be powered with a separate power supply. Be sure that both power supplies share a common GND connection.

Circuit Protection

- Input power is protected from reverse polarity, over voltage, and transient surges.

DCD Device Communications

- A twisted pair, multi-drop, EIA-485 (RS-485) polling scheme is used to communicate from the Net DCD-n to the other Millennium Devices. See "Power Cable" on [page 3-2](#)

Dimensions

- 4.24" x 7.35" @ < 1lb or (10.4 x 18.7cm @ < 0.4Kg)

Programmable Relays

- Each Net DCD-n employs 2 programmable Single pole, Form C, Dry relays that are rated for 4.0 amps @ 24VDC. The relays are suitable for inductive loads with a Power factor of 0.6.

Input Monitoring

- The Net DCD-n has the capability to monitor up to seven independent inputs. Inputs 1-7 can be configured in the software to be either 2 state (no supervision resistors) or 4 state (supervised with 1K ohm resistors). The circuit must see a break time of at least 500 ms for the input to trigger. See "Inputs" on [page 3-8](#)

All Events History Buffer

- 2000 all events history, stored in RAM memory with a minimum of 24 hours backup.

Operating Temperature

- 14° to 104°F (-10° to 40°C) with less than 90% non-condensing humidity.

Event Buffer

- 100 software selectable priority events (inputs, com fail, etc.). These events are stored on-board if the ESCU is off-line with the host computer. They can be programmed to send signals back to the computer if they are enabled and activated.

Cover Tamper

- On-board integrated tamper switch.

Figure 1-3: Net DCD-n with One Reader Drawing

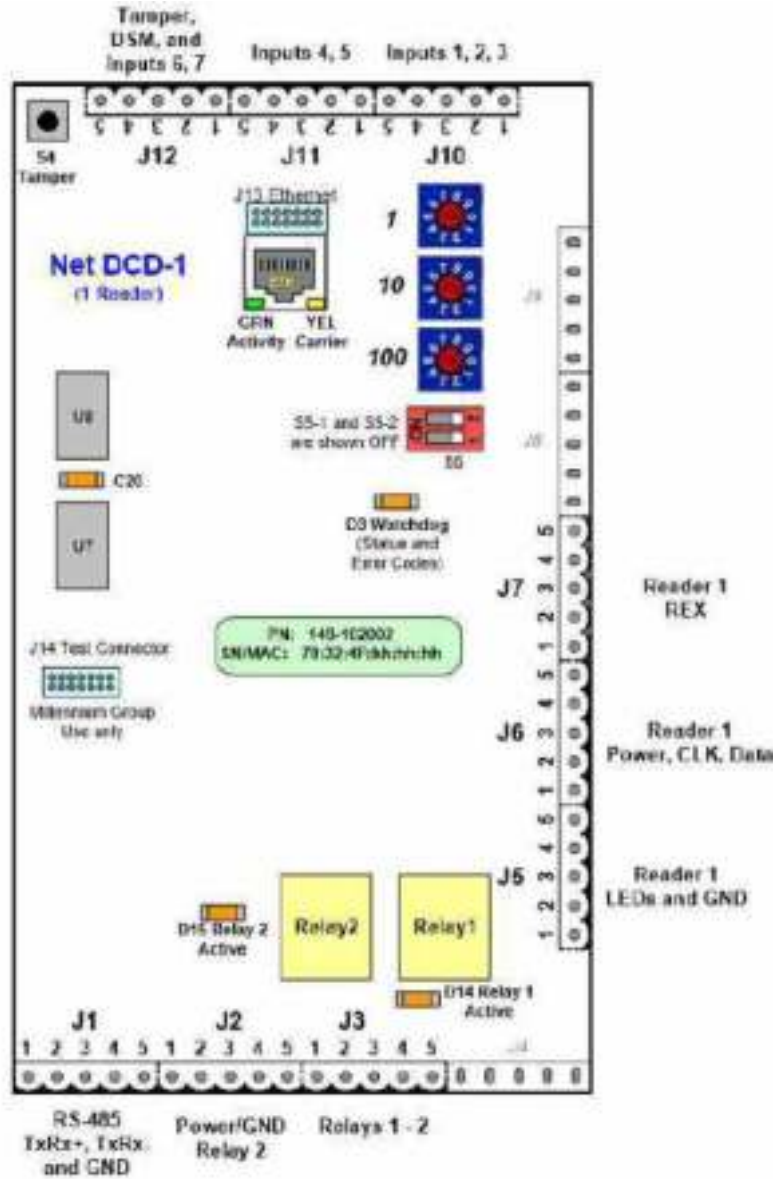
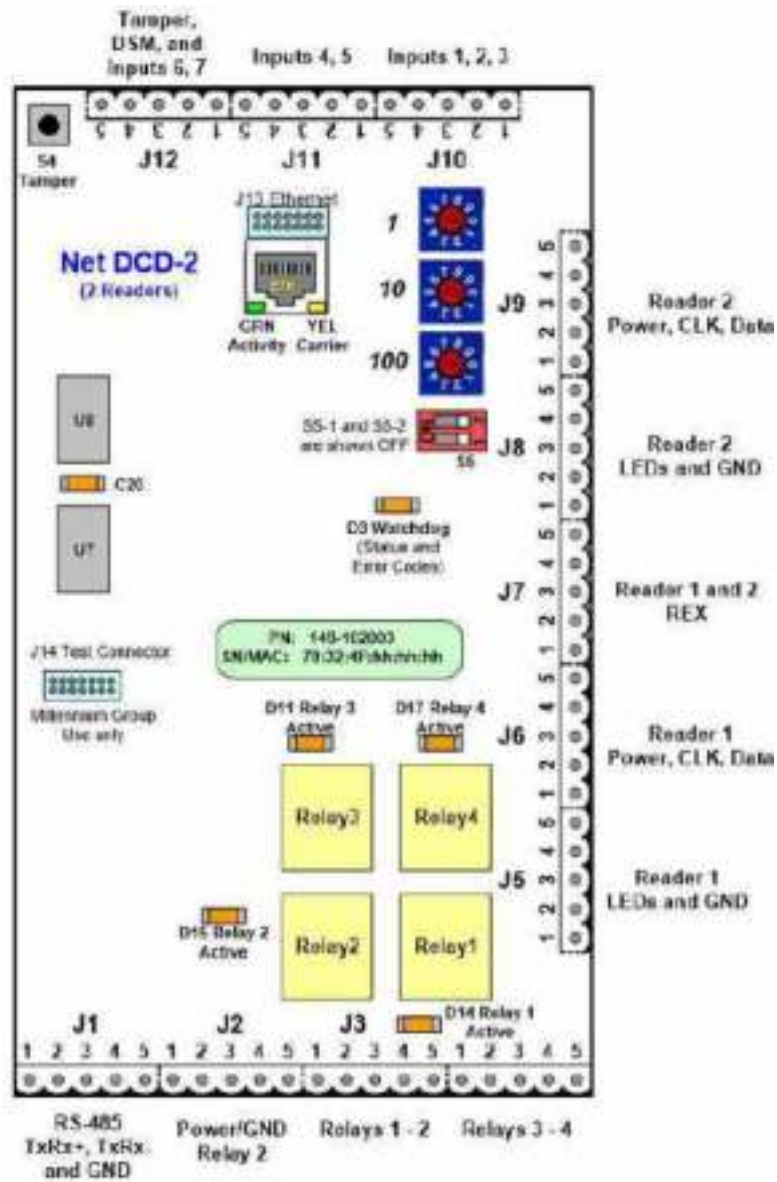



Figure 1-4: Net DCD-n with Two Reader Drawing



Net DCD-n Address Switches

- Three BCD rotary switches  that provide decimal addresses 000 through 999. Usually the first Net DCD-n is unit 000.
- All Net DCD-n units must have a unique address.

D3 Watch Dog

- A Red LED  Watch Dog that indicates Net DCD-n Status and possible Error Codes. See “Watchdog LED (ESCU, Net DCD-n and ED CD)” on [page4-2](#)

ID Sticker

- A factory installed sticker that indicates the Net DCD-n part number and the Ethernet MAC address. The Millennium Group Vendor Code is Hex 78:32:4F and the last six nibbles are the unique address for this particular Net DCD-n.

D14, D15, D11, and D17

- Red LEDs indicating when Relay1 (D14), Relay 2 (D15), Relay3 (D11) and Relay4 (D17) are active.

J1

- EIA-485 (RS-485) TxRx+, TxRx-, and GND. See “Power Cable” on [page3-2](#)

J2

- + 12VDC and GND. See “EIA-485 (RS-485) (ESCU / Net DCD-n and ED CD)” on [page 2-12](#)

J3

- Relays 1 and 2 Connections. See “Relays (Outputs)” on [page3-9](#)

J5, 6, 7

- Reader 1 Connections. See “Readers - Wiegand signaling” on [page3-5](#)

J10, 11, 12

- Inputs 1 through 7. See “Inputs” on [page 3-8](#)

J14 Test connector

- A special connector used by Millennium Group Engineering and Support only.

S4 Tamper

- Built in Tamper switch. See “Inputs” on [page3-8](#)

Mounting

Control Panel Enclosure

The Control Panel Enclosure is built of heavy 14-gauge steel, and includes a back plate ready to receive combinations of 3 Millennium circuit boards. The easy to remove back plate allows for quick assembly, wiring and testing at the dealer's facilities prior to installation. The control panel can then be wall mounted without removing the back plate.

The back plate consists of galvanized steel including 12 stainless steel stand-offs positioned to seat up to three Millennium control boards. Any combination of three EDCDs, ESCUs, or RCDs can be quickly snapped on.

The beige painted control box includes a cam lock, 2 keys, a full length piano hinge, ventilation holes and 6 knock-outs.

- 14.2" x 12.2" X 4.1" (36.2 x 31.1 x 10.5 cm)

Figure 1-5: Control Panel Enclosure



ESCU / EDCD / Net DCD-n Mounting Holes

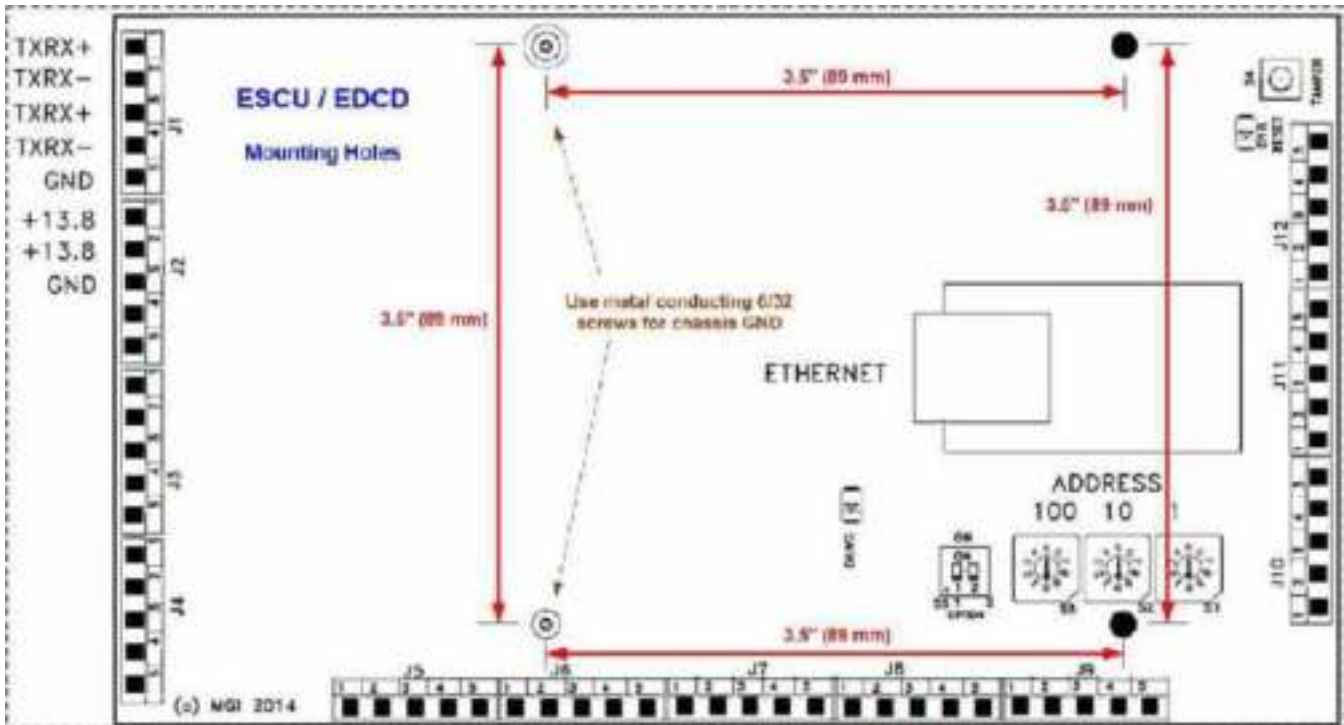
Figure 1-6 on [page 1-17](#) indicates the location of the mounting holes for the ESCU and EDCD.

- Use four 6/32 x 3/8" screws as indicated in the drawing.
- The mounting holes nearest the middle of the board must be attached with metallic conducting screws in order to provide chassis GND to the board.
- Open appropriate 'knock out' holes to run power, EIA-485, readers, inputs, and outputs.

NOTE

The control units and accessories are intended to be installed by the manufacturer's installation instructions, the local authority having jurisdiction and the following installation Standards:
The National Electrical Code, ANSI / NFPA 70.

Figure 1-6: ESCU/EDCD Mounting Holes



PS1 Power Supply

- The PS1 power supply is a robust filtered DC power source for the Millennium controller boards. Its secondary board generates the necessary biasing voltages for the EIA-485 (RS-485) communications, which link the Door Controller boards to the ESCU (Enhanced Site Control Unit).
- Includes batteries, enclosure, and key lock.

PS1 Specifications

Input Power Requirements

- Requires 120 VAC or 220 VAC input on a 5 Amp unswitched dedicated circuit
(*UL only evaluated the 120 VAC power supply.*)

Output Power

- Delivers a regulated and filtered 13.8VDC output at 5 Amps

Battery Backup

- Uses two 6 Volt, 8 Amp lead acid type batteries

Fuse Protection

- The AC input is protected by a 2 Amp slow blow fuse.
- A 5 Amp slow blow fuse is used to protect the batteries.

Protection

- The DC output is current limited against possible short circuits
- AC failure monitoring
- Form A relay output for monitoring the status of the AC input

Cover Tamper Switch

- Form A output to monitor the status of the enclosure door

Operating Temperature

- 14° to 104°F (-10° to 40°C) less than 90% non-condensing humidity

PS1-100212-001

- 14.25" x 12.25" X 4.125" @ 27 lbs
- 36.2 cm x 31.1 cm x 10.5 cm @ 12.2 kg

The **PS1-100213-001 Export Power Supply** was not evaluated by UL.

ESCU, Net DCD-n, and EDCD Initial Setup

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Initial Setup of ESCU / Net DCD-n

The initial hardware setup of the ESCU / Net DCD-n require the following steps:

- Connect Ethernet
- Power the ESCU / Net DCD-n
- Change the IP address
- Add subnet mask and possibly the Gateway Switch
- Configure the IP address of the ESCU / Net DCD-n using *Setup Millennium*

Ethernet (ESCU / Net DCD-n Only)

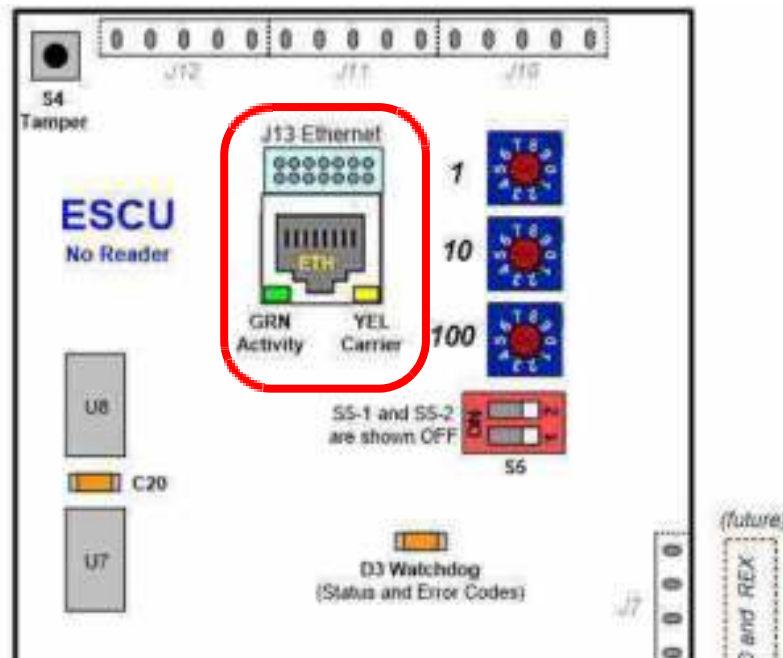
1. Install the Network Adapter (NIC) in J13 (if necessary)



Remove power from the ESCU / Net DCD-n before inserting or removing the network adapter on J13. Use caution when inserting or removing the J13 connector as there are power pins that could damage the board if inserted incorrectly.

2. Connect a network cable to the RJ-45 connector on the NIC. The ESCU / Net DCD-n requires half duplex 10/100 bits/sec. Use minimum CAT 5, with CAT 5E preferred.

Figure 2-1: J13 Network Adapter



NOTE

The techniques described, in this chapter, to set the initial IP Address of the ESCU are identical for the Net DCD-n units. The same is true for resetting the units.

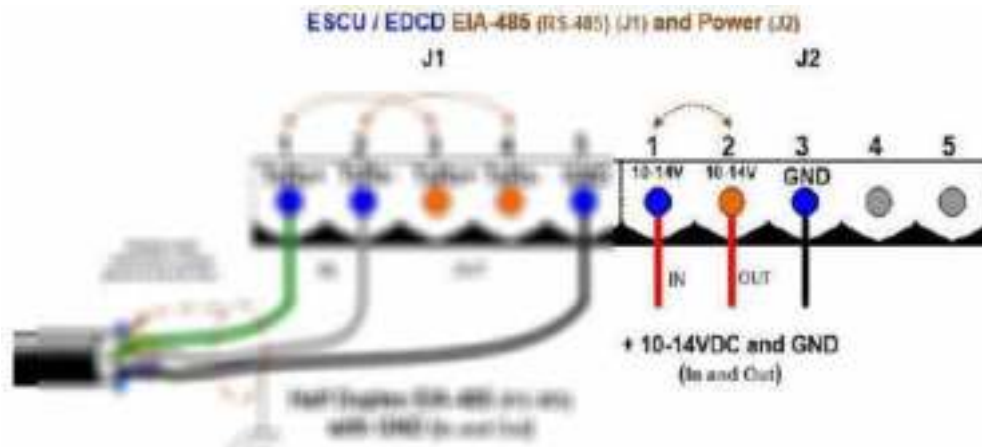
Power and Grounding (ESCU)

3. Connect the Millennium Group PS1 Power Supply (13.8VDC) to pins 1 and 3 of J2.

NOTE

The PS1 Power Supply includes a line conditioner for the EIA-485 (RS-485) chain that is important to get optimal distance and baud rate for the EDCDs.

Figure 2-2: ESCU / EDCD Power Connections



Configure Desired ESCU (or Net DCD-n) IP Address

There are two methods to configure the ESCU IP address:

- SCU (and ESCU) Configuration Utility (Continue at Step 4 below)
- Using the intrinsic setup code in the ESCU via a web browser (Continue at Step 16 at “Web Browser (Alternate) Method” on [page 2-7](#))

The SCU Configuration Utility is the preferred method.

SCU Configuration Utility

NOTE

All ESCUs are shipped from the factory with a default IP address of 192.168.0.254. Only one ESCU should be connected to the network at a time until a new IP address is assigned.

4. Set the ESCU Address Switches to the desired address. (Usually 000 for the first ESCU)
5. Connect the PC and the ESCU to the same network switch or directly together using a crossover cable. (The ESCU supports Auto MDI-X so a crossover is not usually required.)
6. Start the SCU Configuration Utility and login. The default login is *admin* with a password of *admin*.

Figure 2-3: SCU Configuration Utility

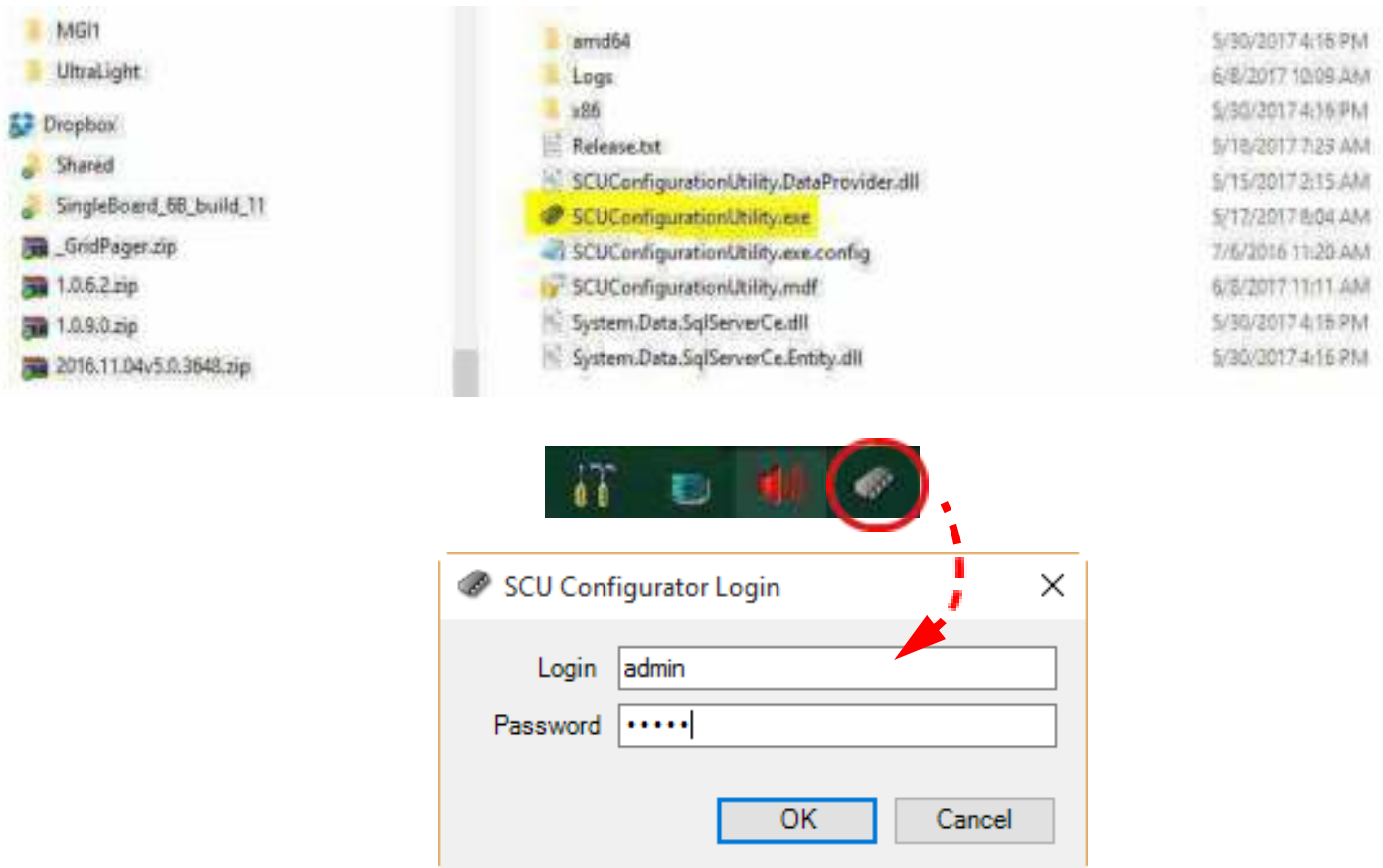


Figure 2-4: SCU Configurator with Default Settings

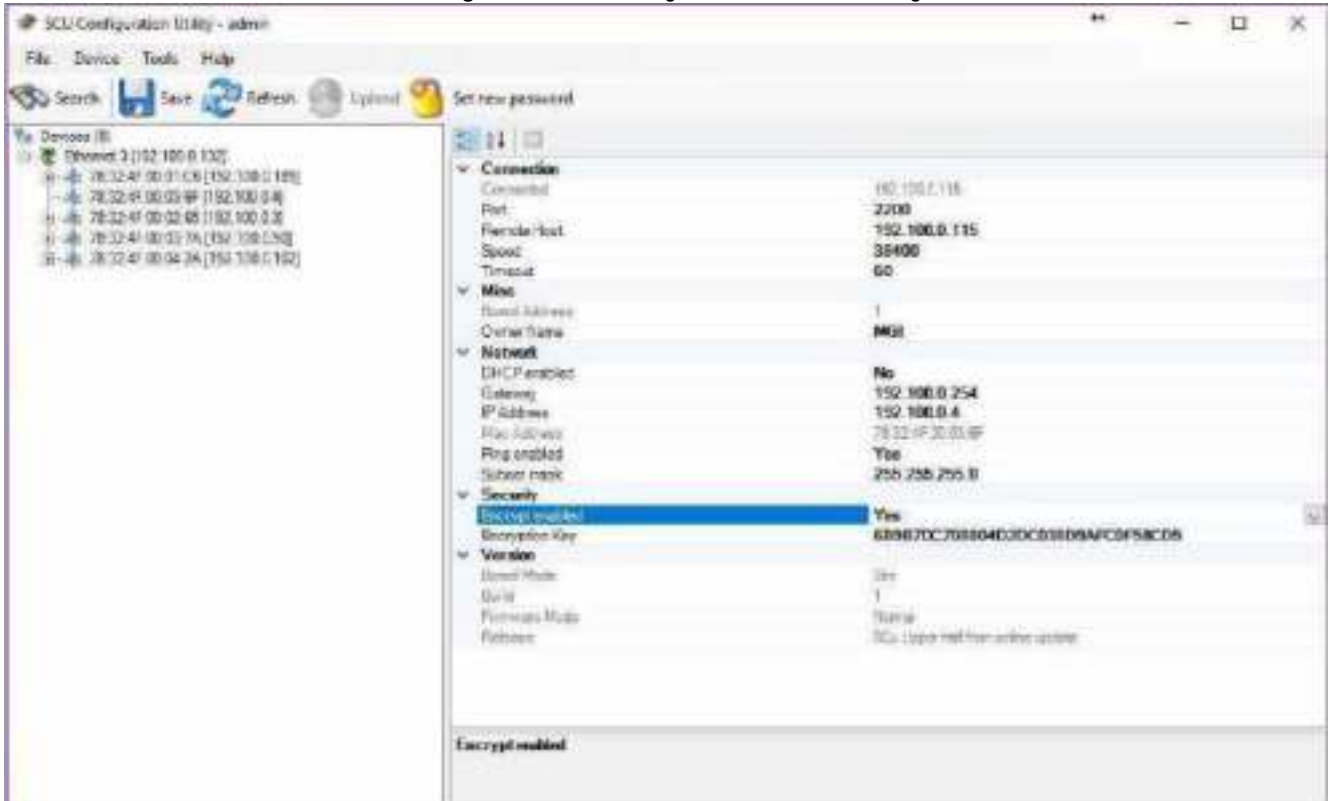


Figure 2-5 illustrates how to make changes in the ESCU. Select the variable in the left column and then select the value from the enumerated list.

The Owner name, Gateway, IP Address, and subnet mask fields can be updated by selecting the right column and typing in the changed value.

7. Enable the ability to Ping the NIC in the ESCU.
8. Leave the TCP/IP Port at 2200. Contact Technical Support for advice if there is a conflict with Port 2200.
9. Set the desired speed in Baud rate.
 - If the ESCU is going to be used to control a site that contains any older revision DCD, ECU or RCD boards, the speed must be set at 4800 baud.
 - If the ESCU is going to be used with only EDCD boards, set the speed at 38400 baud.
 - Speeds of 76800 baud and 153600 baud can be used if the site contains less than 20 EDCDs and the EIA-485 wiring run is shorter than 1000 feet.
10. Set the Owner Name to the licensed name of the Millennium system.
11. If IP address for Remote Host will entered the board will work in "Controller to Host" communication regime
12. DHCP protocol can be enabled to receive IP address automatically
13. Gateway is not required, but can be entered now.
14. Enter the new IP address of the ESCU.
15. The MAC (Ethernet) address cannot be changed.
16. Set the Subnet Mask.

Configure Desired ESCU (or Net DCD-n) IP Address

17. Enable encryption (if necessary), generate the encryption key

Figure 2-5: SCU Configurator - Changes

18. Save the changes and continue with “Setup IP Addresses for Millennium Server” on [page 2-10](#), Step 27 on [page 2-11](#).

Web Browser (Alternate) Method

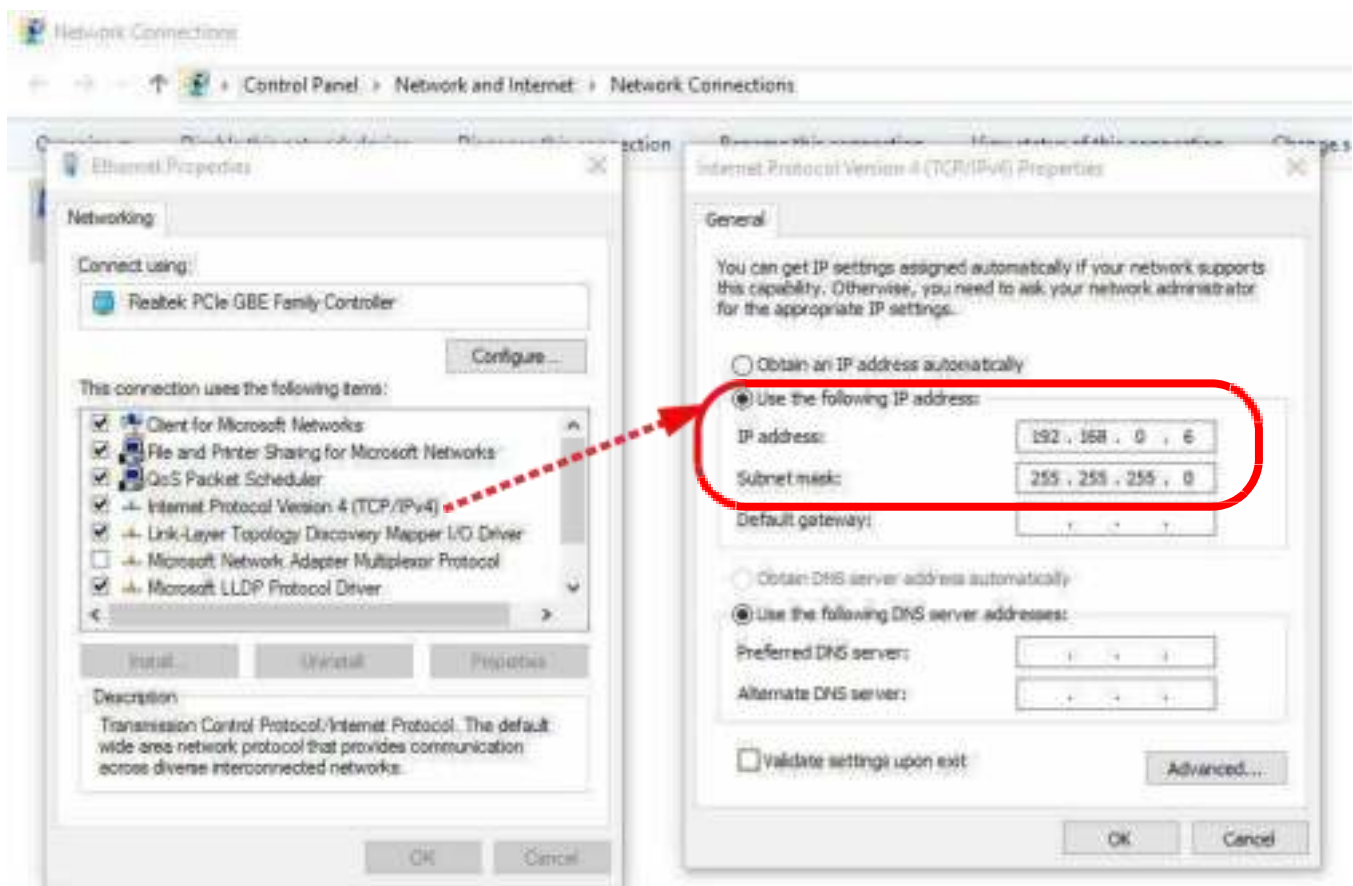
NOTE

All ESCUs are shipped from the factory with a default IP address of 192.168.0.254. Only one ESCU should be connected to the network at a time until a new IP address is assigned.

In order to connect to the ESCU, the computer you are using must be configured with an IP address between 192.168.0.1 and 192.168.0.253.

19. Assign an IP address in the range of 192.168.0.1 through 192.168.0.253 to the PC or Laptop being used for the setup. **Control Panel - Network Connections - Ethernet Properties - IPv4 Properties.** In this example 192.168.0.6 /24 is being used.

Figure 2-7: PC IP Address Change



20. Set the ESCU Address Switches to the desired address. (Usually 000 for the first ESCU)
21. Connect the PC and the ESCU to the same network switch or directly together using a crossover cable. (The ESCU supports Auto MDI-X so a crossover is not usually required.)
22. Open a web browser and type 192.168.0.254 in the address bar. The ESCU configuration web page will be displayed.

Figure 2-8: Initial ESCU Configuration Page

SingleBoard Release: 6Cu Build: 1
 Status: Connected to 192.100.0.115
 Board Mode: Site
 Distributor Mode: Normal
 Board Address: 1
 MAC Address:
 78 12 4F 9 3 4F
 IP Address:
 192 100 0 4
 Subnet:
 255 255 255 0
 Gateway:
 192 100 0 254
 Port: 2200
 Remote Host:
 192 100 0 115
 Speed: 38400
 Disconnect timeout seconds: 60
 Ping: Allowed
 DHCP: Disabled
 Encrypt: Enabled
 Encryption Key(32 hex digits):

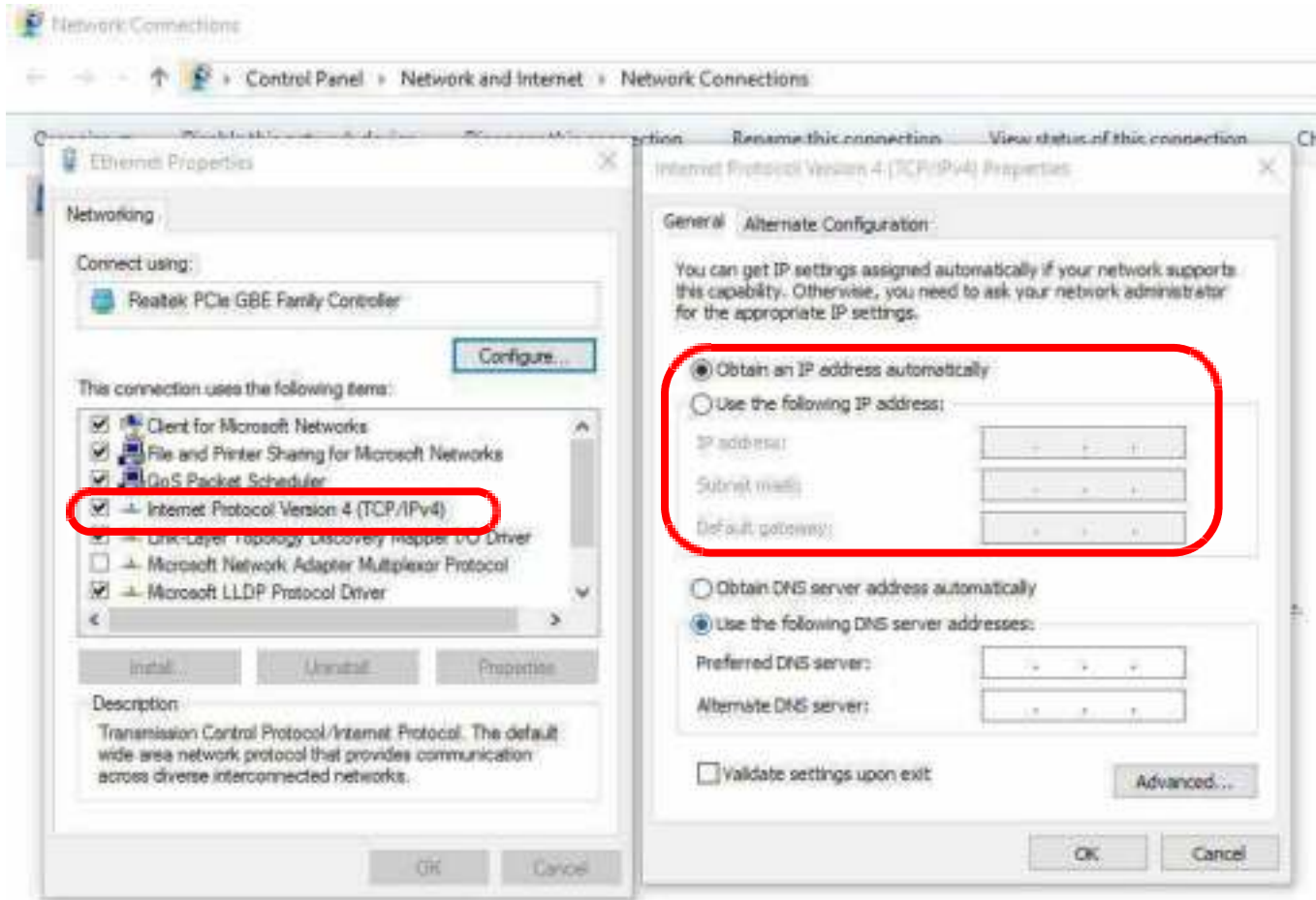
New Password:
 Confirm Password:
 Assign

23. Assign an IP Address, Subnet and optionally a Gateway to the ESCU.
24. Leave the TCP/IP Port at 2200. Contact Technical Support for advice if there is a conflict with Port 2200.
25. If desired, enter a Password. If a password is assigned, this password must be supplied each time the ESCU settings need to be changed.
26. Set the desired speed in Baud rate.
 - If the ESCU is going to be used to control a site that contains any older revision DCD, ECU or RCD boards, the speed must be set at 4800 baud.
 - If the ESCU is going to be used with only EDCD boards, set the speed at 38400 baud.
 - Speeds of 76800 baud and 153600 baud can be used if the site contains less than 20 EDCDs and the EIA-485 wiring run is shorter than 1000 feet.
27. Enable the ability to Ping the NIC in the ESCU.
28. Press the *Assign* button to save the configuration. The Page will indicate *Resetting*.

Configure Desired ESCU (or Net DCD-n) IP Address

29. Set the PC NIC IPv4 address to *Obtain an IP address automatically*, if desired.

Figure 2-11:

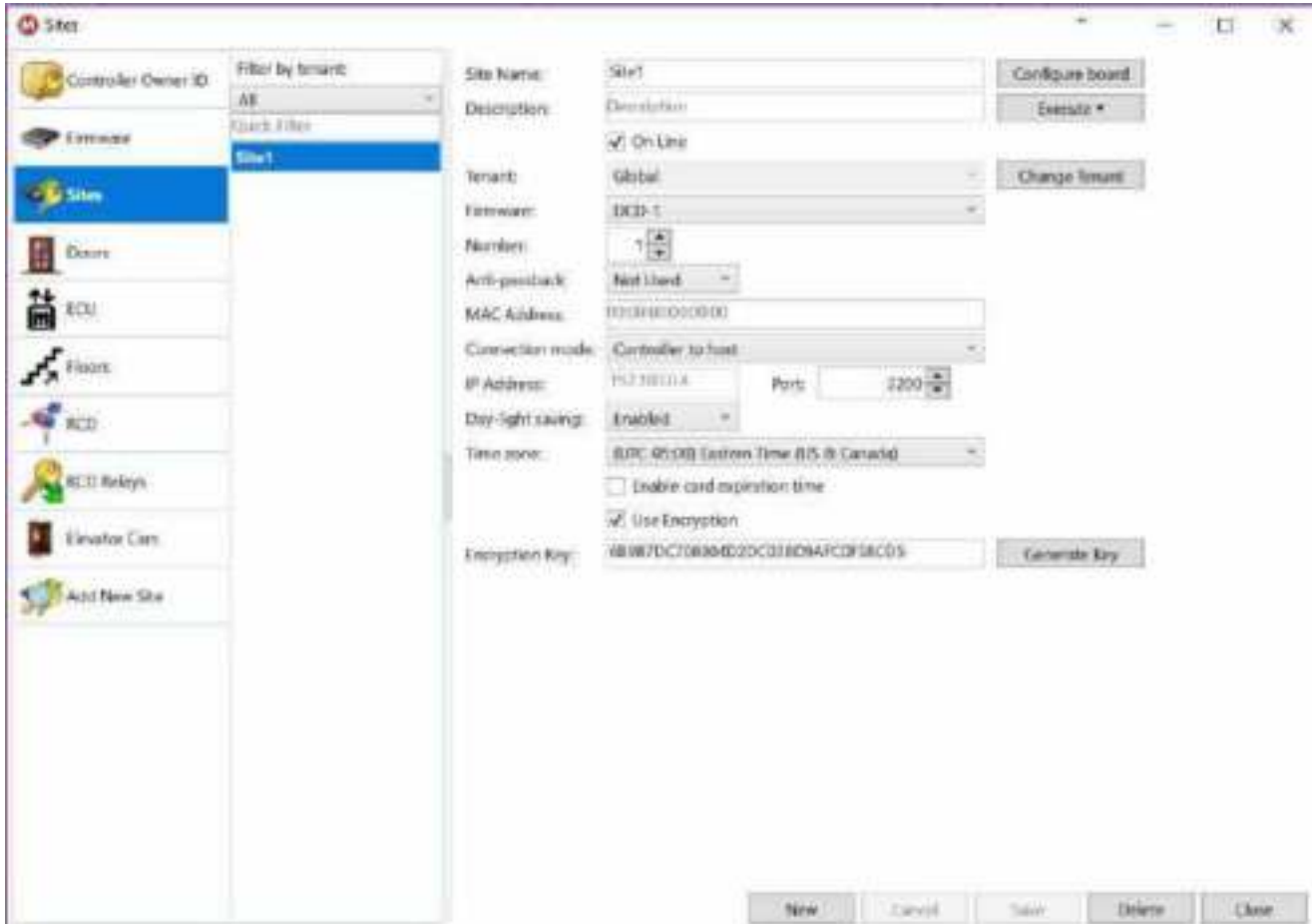


Setup IP Addresses for Millennium Server

Setup Site parameters in Millennium Ultra software

Go to Hardware -> Sites page

Figure 2-12: Setup Site parameters in Millennium Ultra software



30. Enter the IP address of the ESCU NIC and create a Name for it. (Max of 20 characters.)

In this example, the ESCU Site (Site 1) is defined.

31. Press Save button

EDCD Connection

Power and Grounding (EDCD)

Connect the Millennium Group PS1 Power Supply to pins 1 and 3 of J2. Connect the power for the EDCDs from pins 2 and 3 to the same connector on the EDCD.

NOTE

The PS1 Power Supply includes a line conditioner for the EIA-485 (RS-485) chain that is important to get optimal distance and baud rate for the EDCDs.

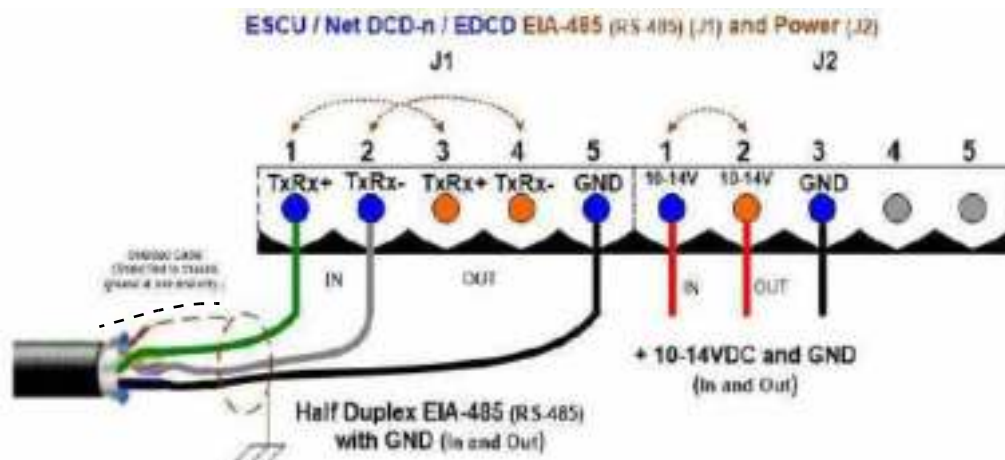
NOTE

It is important that The ESCU, Net DCD-n and EDCDs share common Power GNDs.

EIA-485 (RS-485) (ESCU / Net DCD-n and EDCD)

The ESCU / Net DCD-n and EDCD use Half Duplex EIA-485 (RS-485). Connect to J1, as shown in Figure 2-14. Use shielded twisted pair cable with the shield grounded to chassis ground at one end only. (Recommended to use equivalent to Belden 3106A.)

Figure 2-14: ESCU / Net DCD-n / EDCD EIA-485 (RS-485) Connections



SCU Configurator with EDCDs

After connecting the EDCDs and configuring the Site in the software, the SCU Configurator will indicate the EDCDs as well as the ESCU.

Figure 2-15: SCU Configurator with EDCDs



EDCD / Net DCD-n Connections and Wiring

◆ How to wire Power, Grounding, EIA-485, and Ethernet	3-2
◆ Power and Grounding (ESCU / Net DCD-n and EDCD)	3-2
◆ EIA-485 (RS-485) (ESCU and EDCD)	3-3
◆ Ethernet (ESCU and Net DCD-n Only)	3-4
◆ How to Wire Readers, Inputs, Outputs	3-5
◆ Readers - Wiegand signaling	3-5
◆ Readers - Magnetic signaling (ABA Track 2)	3-6
◆ Readers - MARLOK Signaling	3-7
◆ Inputs	3-8
◆ Relays (Outputs)	3-9
◆ Summary of Wiring Connections	3-10

How to wire Power, Grounding, EIA-485, and Ethernet

Power and Grounding (ESCU / Net DCD-n and EDCD)

Connect the Millennium Group PS1 Power Supply to pins 1 and 3 of J2.

Connect the power for the EDCDs from pins 2 and 3 to the same connector on the EDCD.

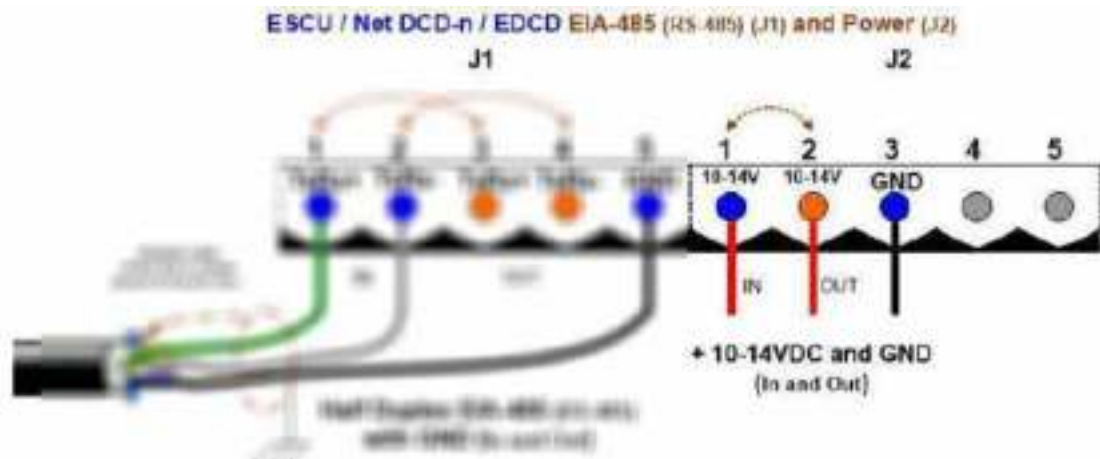
NOTE

The PS1 Power Supply includes a line conditioner for the EIA-485 (RS-485) chain that is important to get optimal distance and baud rate for the EDCDs.

NOTE

It is important that The ESCU / Net DCD-n and EDCDs share common Power GNDs.

Figure 3-1: ESCU / Net DCD-n / EDCD Power Connections



Power Cable

- 2-Conductor #12 AWG (2 wires) ALPHA EQUIV.: # 1892C
- Connects each ESCU, Net DCD-n, and EDCD to the PS1 power supply.

If the number of devices connected to the power supply are 10 or fewer, a smaller cable size may be used.



Local electrical codes may require plenum-rated cable or conduit.

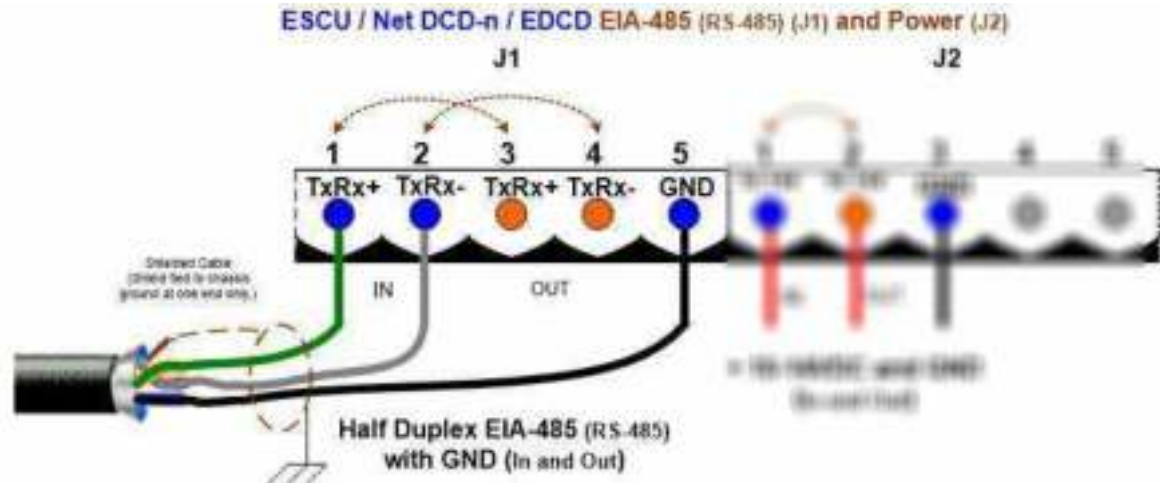
Always check local codes before running any cable.

For UL Listed systems, power supply shall be wired through conduit.

EIA-485 (RS-485) (ESCU and EDCD)

The ESCU and EDCD use Half Duplex EIA-485 (RS-485). Connect to J1, as shown in Figure 3-2. Use shielded twisted pair cable with the shield grounded to chassis ground at one end only. (Recommended to use equivalent to Belden 3106A.)

Figure 3-2: ESCU / EDCD EIA-485 (RS-485) Connections



NOTE

It is important that The ESCU / Net DCD-n and EDCDs share common EIA-485 GNDs.

EIA-485 Specifications

The maximum **Speed**, **Cable Length**, and **Number of EIA-485 nodes** are dependent upon each other and many other factors.

- Millennium Group recommends using 'daisy chain' wiring. A T tap is acceptable if the 'stub length' is less than 5-10 feet, preferably about 3 feet. Longer stubs will attenuate the signals if the connection point (stub) for the node is excessively long. A long stub causes a significant impedance mismatch and signal reflections. All stubs should be kept as short as possible.
- The maximum cable length is 4000 feet (1200 M).
- The baud rate is a function of the quality of the EIA-485 (RS-485) wiring:
 - Distance
 - Cable type (twisted pair, shielded)
 - Wire gauge
 - Number of T-taps
 - Number of EDCDs.
- Possible need for termination. On long cable runs, a termination resistor of 120 ohms, on each end across the Data+ and Data- pins can improve the signal distortion.



Caution: Adding termination on shorter runs is not desirable.

- Star Topology is not recommended.

Communications Cable

1-pair #22 AWG twisted & SHIELDED (2 wires) plus GND (Belden 3106A or equivalent).

Communications between ESCU, Net DCD-n and EDCDs.

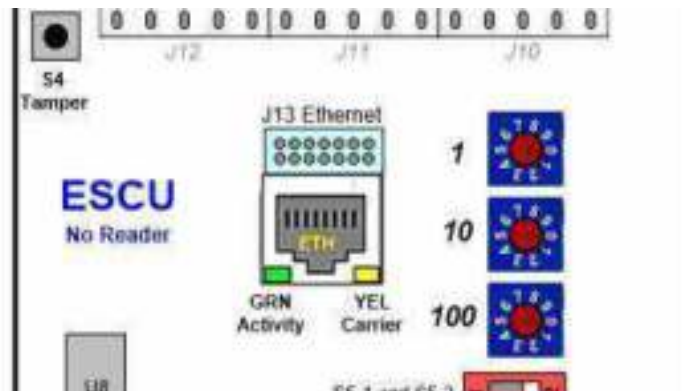
Cable length must not exceed 4,000 feet.

Ethernet (ESCU and Net DCD-n Only)

Network Adapter in J13 supports:

- 10/100 bits/sec. Use minimum CAT 5, CAT 5E preferred.
- Auto Speed detect
- Auto Crossover detect
- Half duplex.

Figure 3-3: Network Adapter



- Yellow LED indicates Carrier connection. No communication will occur unless the YEL LED is lit.
- Green LED indicates TCP/IP activity over Ethernet.

How to Wire Readers, Inputs, Outputs

This section describes how to wire the following supported Reader interfaces:

- Wiegand Signaling (Data 1 and Data 0)
- Magnetic ABA Signaling (Clock and Data)
- MARLOK Signaling (Clock with two Data tracks)

Readers - Wiegand signaling

- J6 has the Power, Data One and Data Zero signals. Power can be either 12VDC or 5VDC. For UL compliance the recorded range for compatibility on the outputs is 5 - 13VDC.
- J1 has the Red and Green LED drives. (GND when true)
- J7 provides for the REX input, if required.

Figure 3-4: Wiegand Signaling Devices

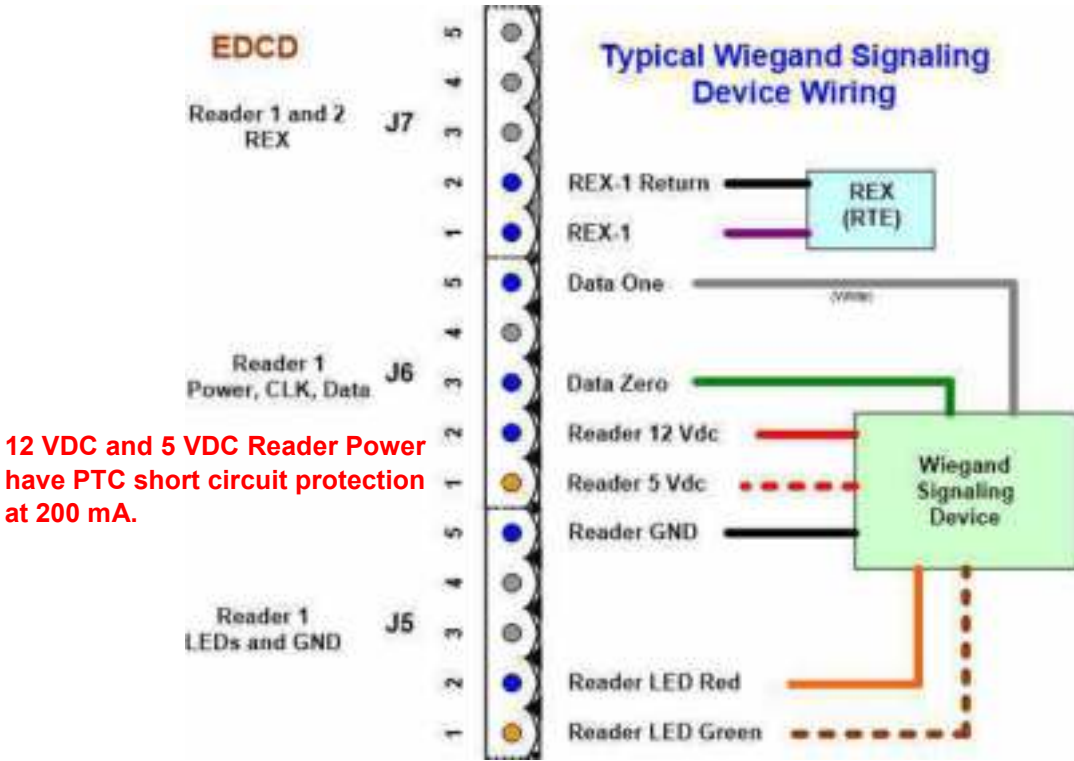


Table 3-1: Read Head to EDCD

AWG	Cable Type	Shield	Max Distance
22	Belden 9942 or equiv.	Yes	200 feet
20	Belden 9260 or equiv	Yes	300 feet
18	Alpha 5386C or equiv	Yes	500 feet

See Table on page 3-10 for recommended cabling sizes and types.

Readers - Magnetic signaling (ABA Track 2)

- J6 has the Power, Clock and Data signals. Power can be either 12 VDC or 5 VDC. Reader Power has PTC short circuit protection at 200mA.
- J1 has the Red and Green LED drives. (GND when true)
- J7 provides for the REX input, if required.

See Table on [page 3-10](#) for recommended cabling sizes and types.

Figure 3-5: Magnetic Signaling Devices

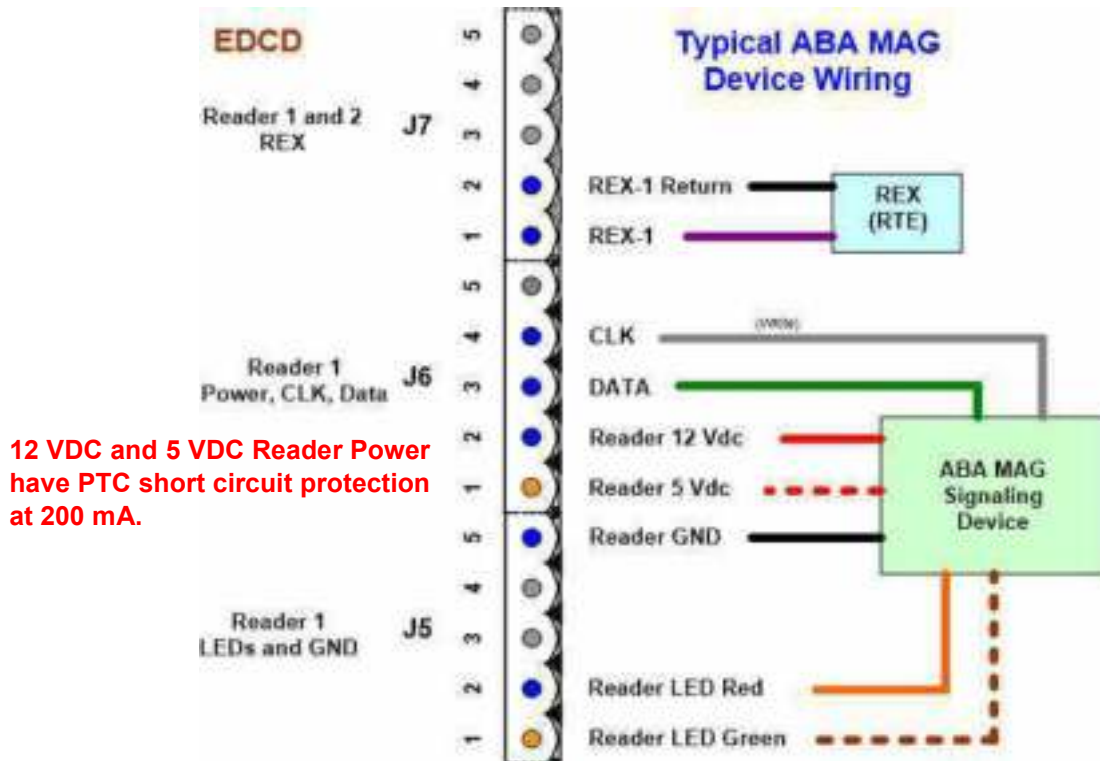


Table 3-2: MAG Read Head to EDCD

AWG	Max Distance
22	10 feet

See Table on [page 3-10](#) for recommended cabling sizes and types.

Readers - MARLOK Signaling

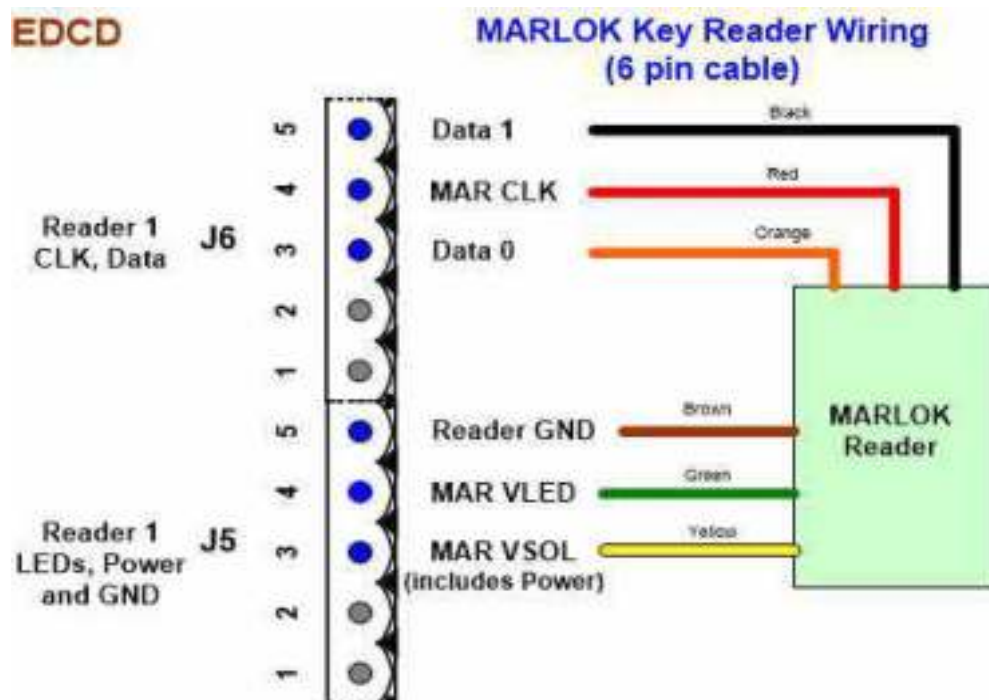
NOTE

The MARLOK wiring setup was not evaluated by UL and shall not be enabled in a UL 294 compliant system.

- J6 has the Clock and Data signals.
- J5 has Power (MAR VSOL), the VSOL signal and the Green MAR VLED drive.

See Table on [page 3-10](#) for recommended cabling sizes and types.

Figure 3-6: MARLOK Wiring



Connect access control reader device to Door Control Device (DCD) board.

- Use six-conductor Leader Cable, supplied by Millennium Group for **Keylocks** and **Keyreaders** (unshielded).
- The unshielded Millennium Group Leader Cable may also be used with certain Wiegand devices and card readers that do not require SHIELDED cable.
- Recommended cable length for **Keyreaders** and **Keylocks** is 15feet–maximum.
- Length **MUST NOT** exceed 35 feet. To avoid interference at this higher limit, cable must be run separately – not bundled with other wires.

See Table on [page 3-10](#) for recommended cabling sizes and types.

Inputs

- Inputs 1 through 4 are supervised with 1K ohm resistors, as shown in Figure 3-7.
- Inputs 5, 6, and 7 are non-supervised, Normally Closed circuits. Input 7 is used for the Door State Monitor (DSM) and Inputs 5 or 6 can be used for a UPS battery low signal. There is a special input for the External Tamper. Use any one of the GND Returns for the External Tamper Return.

Returns are tied together and also to GND.

Figure 3-7: Inputs

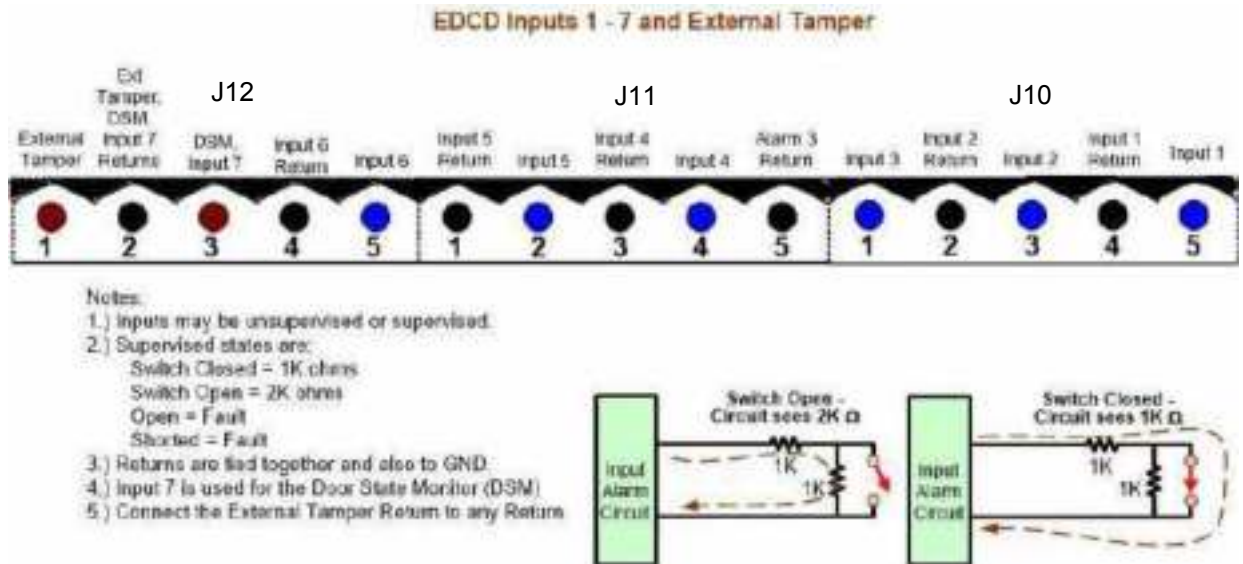


Table 3-3: Input Circuit to EDCD

UL Compliant	AWG	Cable Type	Shield	Max Distance
No	22	Alpha 5002C or equiv.	No	1000 feet
Yes	22	Belden 8761 or equiv	Yes	2000 feet

See Table on [page 3-10](#) for recommended cabling sizes and types.

Relays (Outputs)

J2 and J3 provide the Common (C), Normally Closed (NC), and Normally Open (NO) pins for the two relays.

These Dry relays (Dry = requires external power) are typically used for the Door Latch and possibly an automatic door opener.

NOTE

For UL 294 compliance the relays are to be loaded to a maximum 24VDC, 4 Amps. (Suitable for inductive loads.)

Figure 3-8: Relays (Outputs)

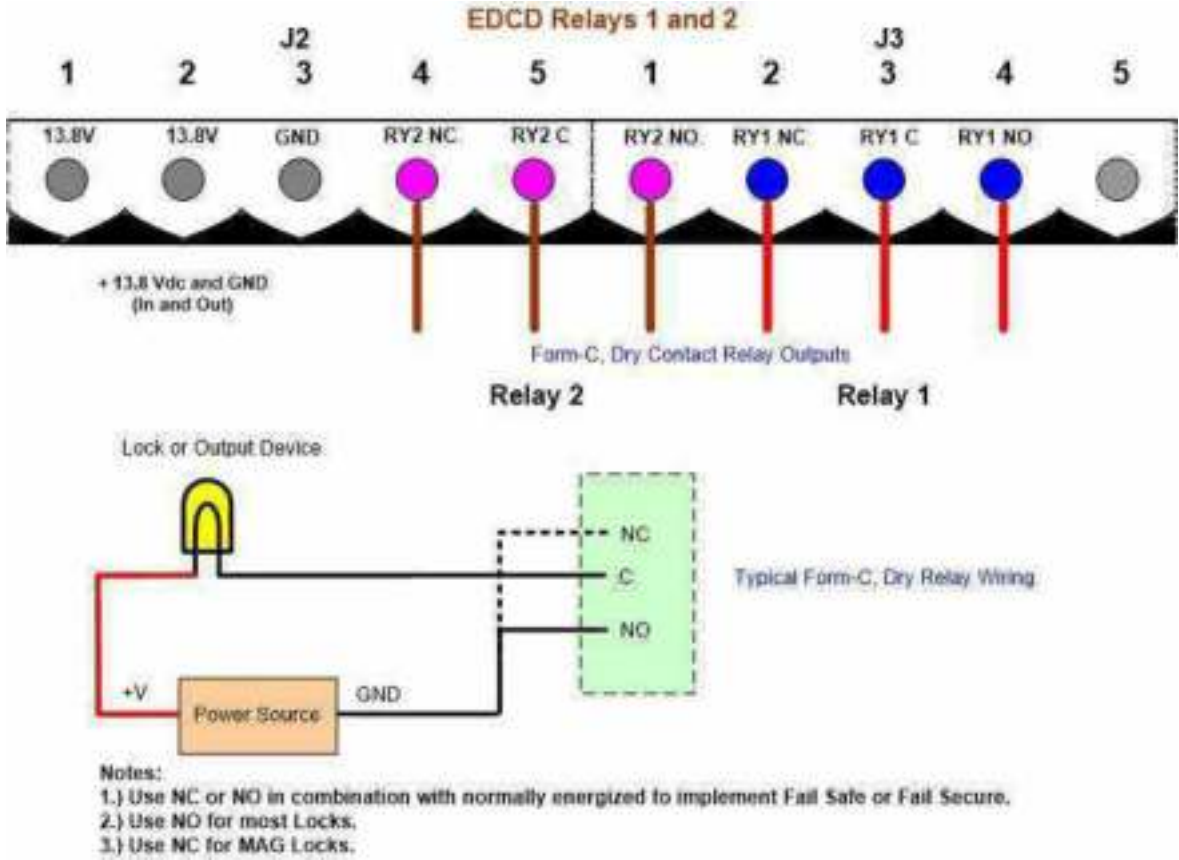


Table 3-4: EDCD Relay Outputs

AWG	Cable Type	Shield	Max Distance
18	Alpha 1897C, Belden 8461 or equiv	No	25 feet

Relays are rated at 10 Amps with PTC thermistor over current protection at 4 Amps.

Use the Suppression Kit supplied with EDCDs to provide strike protection.

If the power supply is DC, install a diode across the door lock to suppress energy surge. The cathode must be on the positive side of the strike.

If the power supply is AC, install a varistor across the door strike.

See Table on [page 3-10](#) for recommended cabling sizes and types.

Summary of Wiring Connections

Table 3-5: Cable Types and Lengths

Signal	From	To	MFG. # or Equiv.	AWG	Shield	Max Length
Power	PS1	ESCU and EDCDs	Alpha 1892C	12	No	
EIA-485 (RS-485) Comm	PS1	ESCU and EDCDs	Belden 3106A	22	Yes	4000 feet
RJ-45 Ethernet	Switch	ESCU	CAT-5, preferably CAT-5E	24	No	100 meters
Reader -Wiegand	EDCD	Read Head	Belden 3106A	22	Yes	200 feet
Reader -Wiegand	EDCD	Read Head	Belden 3106A	20	Yes	300 feet
Reader -Wiegand	EDCD	Read Head	Alpha 1892C	18	Yes	500 feet
Reader - MAG	EDCD	Read Head	N/A	22	Yes	10 feet
Reader - MARLOK	EDCD	Reader	MARLOK	22	Yes	15 feet
Inputs	Input	EDCD	Alpha	22	No	1000 feet
Inputs UL Compliant	Input	EDCD	Belden	22	Yes	2000 feet
Output Relays	EDCD	Control Device	Alpha Belden	18	No	25 feet

ESCU, Net DCD-n and EDCD Service Topics

◆ Watchdog LED (ESCU, Net DCD-n and EDCD).....	4-2
◆ Normal Operational Blink Codes.....	4-2
◆ D3 Flash Codes and their meaning	4-3
◆ Firmware Update ESCU, Net DCD-n and EDCD	4-4
◆ How to update the ESCU firmware	4-4
◆ How to update the EDCD firmware.....	4-7
◆ How to Factory Reset the ESCU or Net DCD-n	4-10
◆ S5 Factory Reset Method	4-10
◆ Alternate Reset Method	4-11
◆ Assistance.....	4-12
◆ Contact Technical Support	4-12
◆ Millennium Group Web Sites	4-12

Watchdog LED (ESCU, Net DCD-n and EDCD)

Normal Operational Blink Codes

ESCU / Net DCD-n

ESCU / Net DCD-n D3 with a (slow) 1 per second blink rate.

- No valid Millennium messages detected on network port.

ESCU / Net DCD-n D3 with a (fast) 2 per second blink rate.

- Valid Millennium messages detected on network port.

EDCD

EDCD D3 with a (slow) 1 per second blink rate.

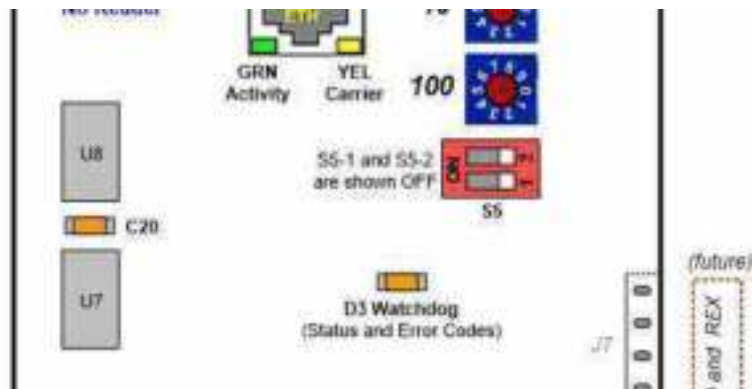
- Not receiving messages or polls

EDCD D3 with a (fast) 2 per second blink rate.

- Receiving messages or polls

On the EDCD, even though D3 might be flashing fast, it just indicates valid messages have been detected, not necessarily to its address.

Figure 4-1: D3 Watchdog (Dawg) LED



D3 Flash Codes and their meaning

Table 4-1 lists the Status and Error Codes. The number indicates how many consecutive flashes occur before a Pause.

Table 4-1: Status and Error Codes

Number of consecutive Flashes before a pause	Definition
2	Flash programmed and ready, awaiting reset
3	Flash is protected when it shouldn't be (should never occur).
4	Flash was accessed incorrectly
5	No working RTC (Real Time Clock)
6 (ESCU / Net DCD-n only)	No network interface daughter board detected
7 (ESCU / Net DCD-n only)	No working network interface detected
8	RAM not storing correctly after reset

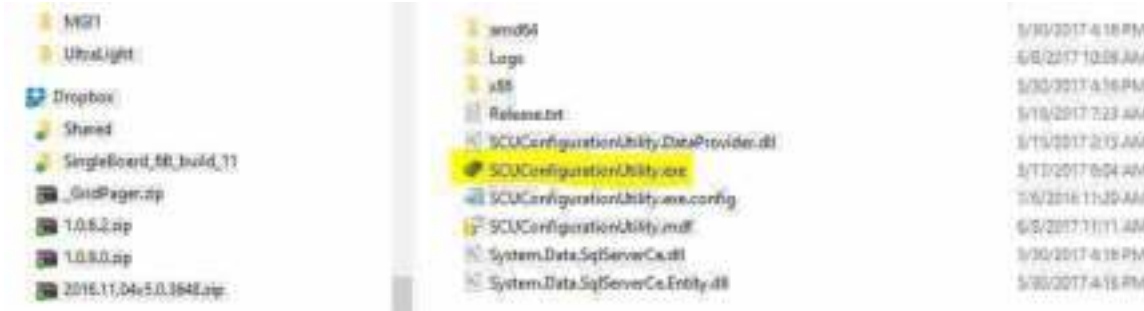
Firmware Update ESCU, Net DCD-n and EDCD

How to update the ESCU/EDCD firmware with SCU Configuration Utility

Steps to Update ESCU Firmware

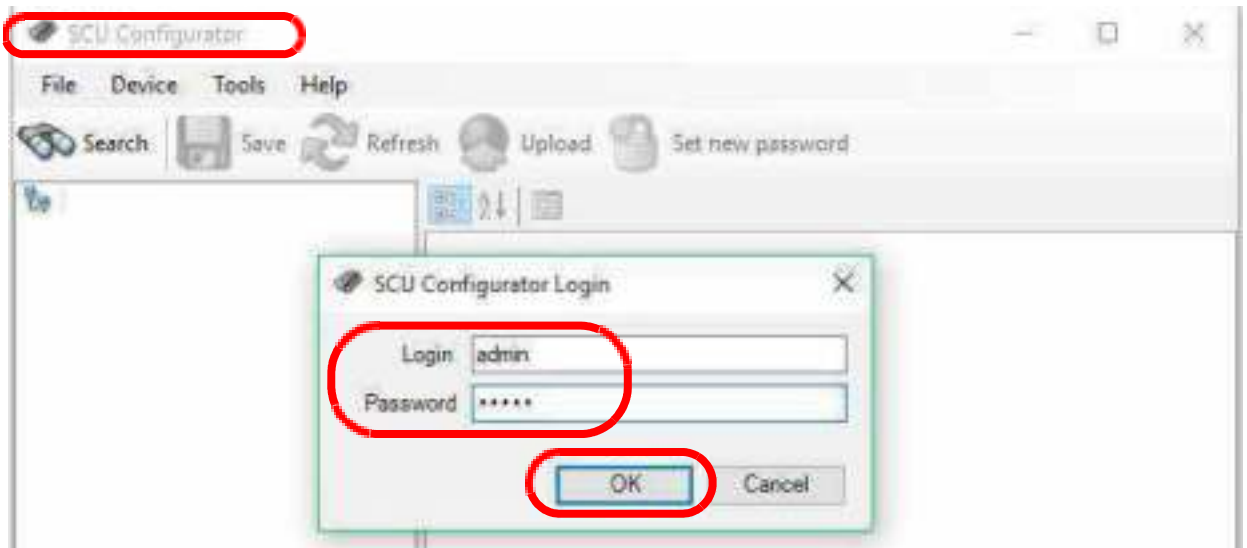
1. Run SCU Configuration Utility (SCUConfigurationUtility.exe)

Figure 4-2: SCU Configurator Utility



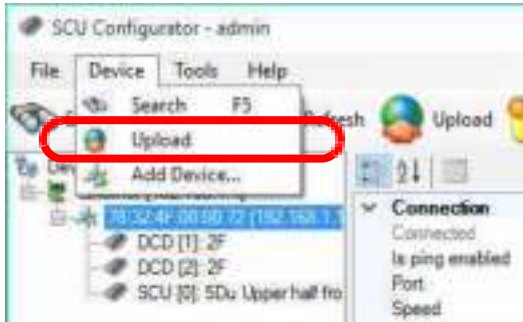
2. Login to the software. The default Password is *admin*.

Figure 4-3: SCU Configurator Login



3. Select *Device > Upload*

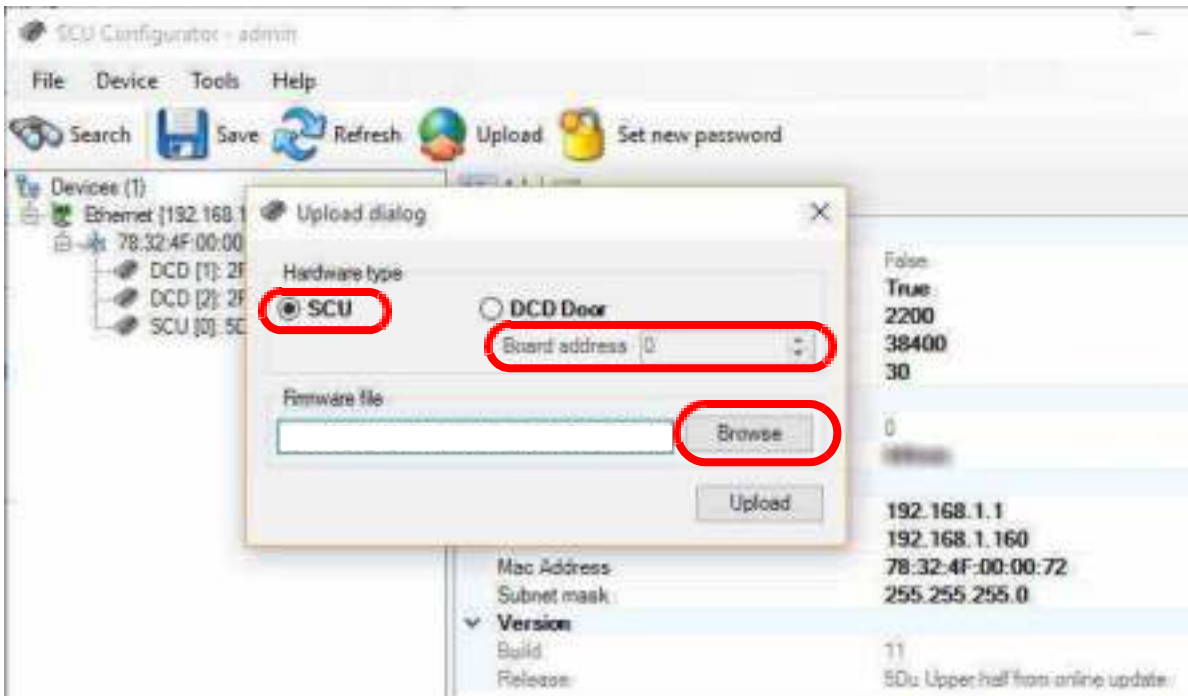
Figure 4-4: Device Upload



4. Select SCU in Hardware Type.

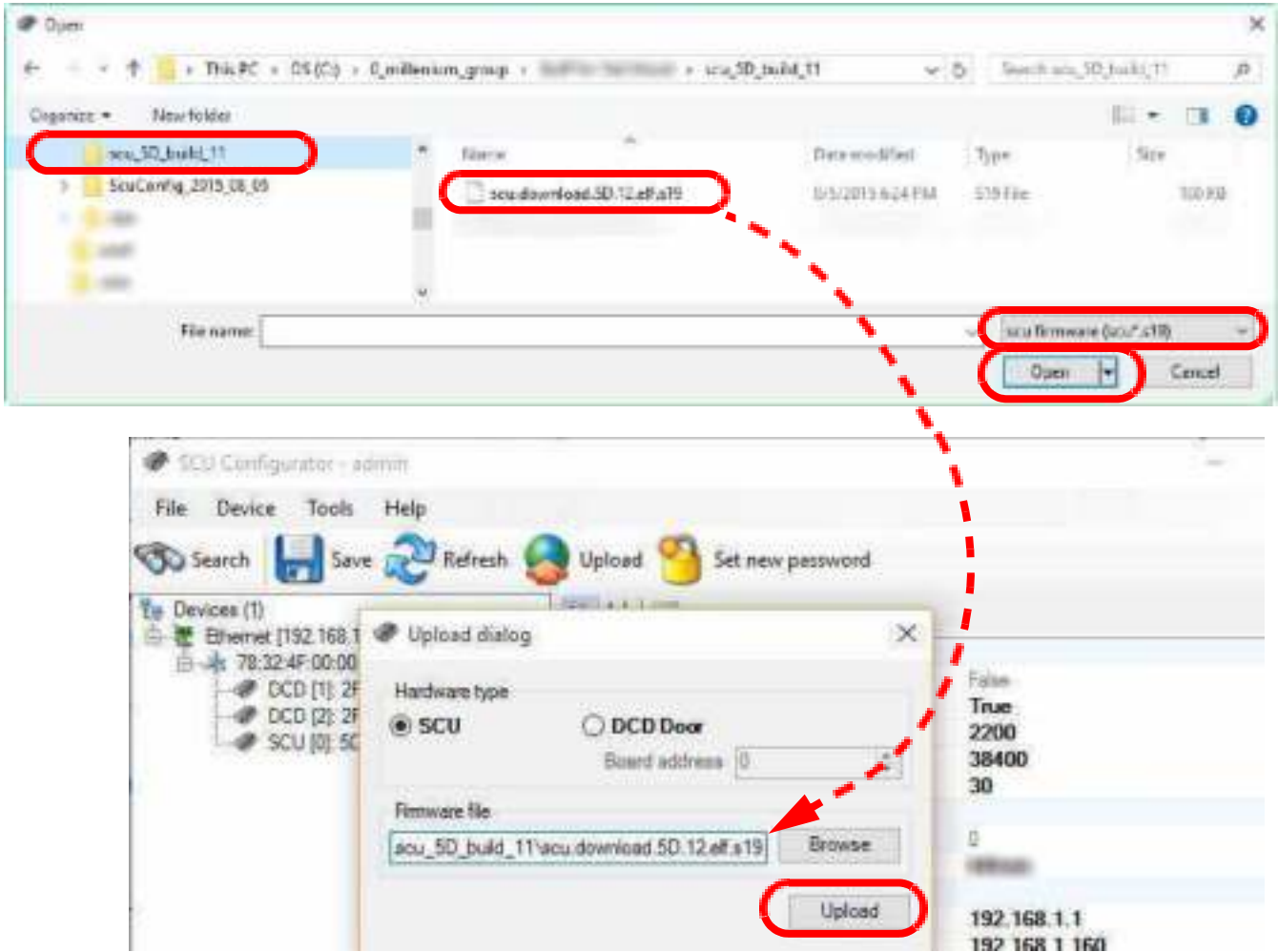
5. Browse for the firmware file (ELF.s19 extension) and select the file

Figure 4-5: Upload Dialog



6. Press Upload button

Figure 4-6: Upload EDCC firmware file



For EDCD firmware operator should enter the EDCD board address.

Figure 4-7: Upload EDCD firmware dialog



How to Factory Reset the ESCU or Net DCD-n

S5 Factory Reset Method

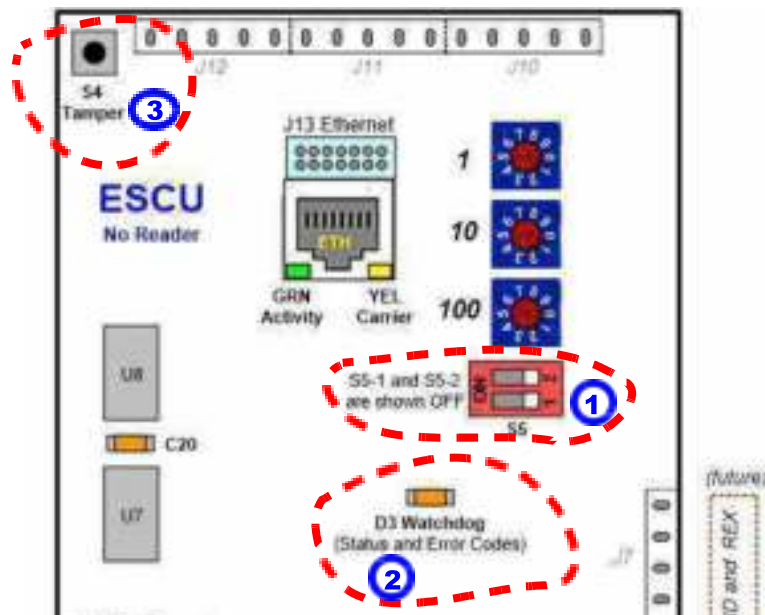
- The S5-1 or S5-2 switch, along with the Tamper switch can be used to reset the ESCU back to the factory shipped state (e.g, IP = 192.168.0.254). The process of resetting the ESCU using the S5 switch is the 'True' factory reset. S5 and S4 will put the board back to the factory shipped state.

Steps to factory reset the ESCU

1. With ESCU powered *OFF*, set S5-1 to the *ON* position.
2. Power up the ESCU. The D3 Watch dog LED will be on.
3. Press and release the Tamper Switch three times, then set S5-1 *OFF*.
4. The Watchdog LED will go off for a few seconds, then flashslow.
5. Setup screen will revert to the default settings:
 - IP address: 192.168.0.254
 - Subnet Mask: 0.0.0.0
 - Gateway: 0.0.0.0
 - Port: 2200
 - No Password
 - Speed: 4800

NOTE The MAC address is permanent and does not reset.

Figure 4-11: Factory Reset



Alternate Reset Method

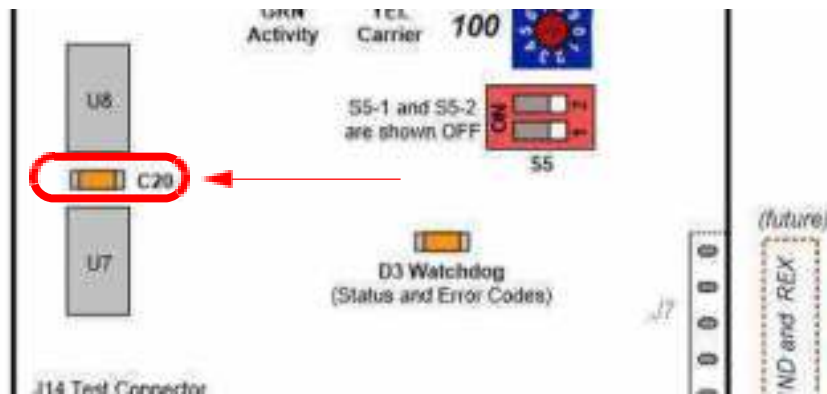
C20 Board Reset - Alternate Method

- The S5 and C20 resets are actually somewhat different. Shorting C20 deletes memory from the board (i.e., current configuration and history of transactions) and resets the ESCU's *Owner Name* back to the default of *Demo. Not for sale*. Resetting using C20 retains IP address, Baud rate, Ping setting and Gateway. The *Owner Name* is downloaded to the ESCU and the ESCU will only communicate to the software if the Site Name in the software = *Owner Name*. C20 is useful if the ESCU was previously communicating with a different system and the *Owner Name* needs to be reset so it will come on-line with the new system.

Steps to Reset using C20

1. Turn POWER OFF
2. Short across capacitor C20 (the small SMT cap between RAM chips U7 and U8 for Tenseconds).
3. Turn Power back on.

Figure 4-12: C20 Reset



Assistance

Contact Technical Support

Authorized Dealers can contact Technical Support by:

- Telephone **1-866-455-5222**
- E-mail directly to **tsupport@millennium-groupinc.com**

Millennium Group Web Sites

Our company website is **www.millennium-groupinc.com**

A Tech Support portal is under construction with more documentation. (Customers can also open tickets directly from here.) **support.millennium-groupinc.com**